Task Knowledge Commonality Analysis Method (TKCAM)

User's Manual

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This document is a step-by-step guide to Military Occupational Specialty (MOS) commonality analysis using the Task Knowledges Commonality Analysis Method (TKCAM). TKCAM is an analytical method that can be used to determine the commonality between MOSs in terms of the knowledges that soldiers need to perform their jobs. The method can be used to assess the feasibility of restructuring MOSs. The manual has been prepared for action officers at the personnel proponent office level or elsewhere who have responsibility for assessing MOS restructuring proposals. It consists of procedures, worksheets, and guidance the user can apply to MOS structuring actions that require commonality analysis.

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TKCAM USER'S MANUAL

OVERVIEW OF THIS USER'S MANUAL

The Task Knowledges Commonality Analysis Method (TKCAM) is an analytical method that can be used to determine the commonality between two or more Military Occupational Specialties (MOSs) in terms of the knowledges that soldiers need to perform their jobs. TKCAM may be used to assess the feasibility of an MOS restructuring before work is initiated to prepare a Military Occupational Classification and Structure (MOCS) proposal in accordance with the AR 611 series.

This document is a step-by-step guide to using TKCAM. The material it contains has been prepared for the action officer at the personnel proponent office level or elsewhere (referred to here as the "TKCAM Analyst") who is charged with performing MOS structuring actions.

This manual consists of procedures, worksheets, and guidance the user can apply to MOS structuring actions that require commonality analysis. The first chapter of this manual is an introduction to TKCAM. It explains commonality analysis, the concepts on which TKCAM is based, and the roles and responsibilities of those who use the TKCAM. The remaining chapters document the four major steps comprising the TKCAM procedure.

Eight appendices accompany the manual. They contain important reference information, forms, guidelines, sample commonality analyses, and briefing guides.

Using a systematic method such as TKCAM to develop MOS restructuring proposals may lead to better decisions. This can help insure better personnel utilization, improved career opportunities, more efficient training, and reduced overhead, among other benefits that are typically the goals underlying an MOS restructuring.

TKCAM USER'S MANUAL

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TKCAM USER'S MANUAL

INTRODUCTION

WHAT IS TKCAM?

TKCAM is an analytical method that can be used to determine the commonality between two or more MOSs in terms of the "knowledges" that soldiers need to perform their jobs. When issues of merging or restructuring MOSs occur, TKCAM can be used during early planning stages to assess the feasibility of the proposed re-design before efforts are invested in developing a MOCS proposal in accordance with AR 611 series.

Using TKCAM, a personnel analyst can identify whether the knowledge requirements for job performance of two MOSs are similar or different. If substantially different, a merger will require expanding the training for the new MOS in order to ensure soldiers are capable of performing all tasks encompassed previously in two separate MOSs. On the other hand, if there is a large overlap in the knowledges required, the MOSs may be merged, all other factors being equal.

BASIC TKCAM CONCEPTS

TKCAM is an analytical method used by a personnel analyst, often a member of a personnel proponent office who has been tasked with evaluating proposals for restructuring existing MOSs. The lead person is referred to here as the "TKCAM Analyst".

The Process

The basic methodology used in TKCAM is "commonality analysis". The focus is on "knowledge", i.e., what the soldier needs to know to perform his job. A list of knowledges is developed for all MOSs under consideration. This is accomplished by panels of subject matter experts (SMEs) who are senior noncommissioned officers (NCOs). Using these data, knowledge profiles of each MOS are formulated. These then are systematically compared in an "MOS comparison matrix" to identify which knowledges are commonly required among the MOSs being considered for restructuring.

"Knowledge" in TKCAM

Knowledges are defined in TKCAM as:

> What soldiers need to know to perform their jobs. These are specific classifications of theoretical and practical knowledge needed by soldiers to perform in their MOSs. Knowledges in TKCAM are <u>not</u> specifically task related, that is, one or more may be required to perform a task and more than one task may require the same knowledge.

NOTE
In TKCAM, the knowledges required by an MOS are identified by SMEs based, in part, on their experience. POIs and soldier's manuals are also sources from which knowledges are identified.

Examples of knowledges that may be identified in a TKCAM application are "Principles of Electricity" or "Optics". Task-specific knowledge like "M109 Turret Electrical Schematics" should be avoided. If task-specific knowledges cannot be avoided, effort should be made to isolate the more specific knowledges. For example, an alternative approach would be to identify two knowledges: "M109 Turret" and "Electrical Schematics".

OVERVIEW OF USER'S MANUAL

The TKCAM process is organized into four functional activities, or steps. These are presented in this manual in the order in which they should be accomplished by the TKCAM Analyst or others under the analyst's direction. The four TKCAM steps are:

Step 1.0 Preparation

Step 2.0 Data Collection

Step 3.0 Analysis

Step 4.0 Documentation.

Each step is described in a standard format providing an overview and identifying responsibilities for the TKCAM analyst and SMEs, data requirements, products, and step-by-step procedures. Each step is comprised of substeps which are described using a similar format.

There are eight appendices. Appendix A lists acronyms used in this manual. Appendix B is a form to record information about the background and experience of the SMEs who participate in

the analysis. The third appendix provides suggestions for how to identify, verify, and match knowledges for a TKCAM study. Appendix D lists, as examples, knowledges which have been identified in previous TKCAM applications. Appendix E contains a limited sample set of data representing a hypothetical TKCAM analysis that studies the potential for consolidating three MOSs; this sample shows how data are recorded on worksheets using the TKCAM procedures. The last three appendices contain briefing packages which can be used by the TKCAM Analyst to present an orientation to SMEs participating on three different TKCAM panels; briefing charts and narrative highlighting the SMEs' role and tasks have been tailored for each orientation.

A TYPICAL TKCAM SCENARIO

Under what circumstances and when is a TKCAM application appropriate?

When ideas are circulating that existing MOSs should be merged or restructured in some way, TKCAM can be used to assess the feasibility of such changes. The focus of a TKCAM analysis is "commonality of knowledges". TKCAM provides a systematic way to look at this one MOS dimension, what the soldier needs to know to perform the job. While there are many factors that must be weighed in changing existing MOSs, TKCAM's focus provides insight in terms of a key characteristic. TKCAM can be used before effort is invested in developing a MOCS proposal. If TKCAM data indicate that a restructuring is not feasible, e.g., there are few common knowledges between existing MOSs, a decision may be made not to prepare a MOCS proposal. On the other hand, if there are many common knowledges, the basis may exist for merging MOSs and further analysis and documentation would be in order.

NOTE
Many TKCAM applications address merging two or more MOSs into one. TKCAM may be used to assess more complex restructurings such as consolidating many MOSs to fewer MOSs. The procedures here support analysis of restructurings involving any number of MOSs and any type issue, including mergers, consolidations, specialization, and so forth.

How is a TKCAM application initiated (Step 1.0)?

The decision to perform a TKCAM application is typically made by the personnel proponent office. An individual is assigned responsibility as the TKCAM Analyst. The analyst first must develop an understanding of: (1) the MOS issues that must be addressed and (2) TKCAM (by reading and studying this manual). Then, the analyst prepares a work plan identifying the steps that must be performed and milestones. Arrangements must be made for SMEs, a meeting or work room, reference materials, personal computers, and clerical support. The time required for organizing the study by the TKCAM Analyst usually is a few days,

although the elapsed time from start to finish might entail a couple of weeks while arrangements and commitments are made for SMEs and other resources.

What role do the SMEs play (Step 2.0)?

The key to a TKCAM application is the development of data, particularly, an identification and analysis of the knowledges the soldier needs to know to perform his job. These data are developed by SMEs who participate on three different panels.

The purpose of the first panel is to identify the knowledges required to perform the duties of each MOS included in the study. There are usually two senior NCOs for each MOS assigned to the first panel. When the panel initially meets, the TKCAM Analyst will brief them regarding TKCAM and their role and task. The TKCAM Analyst will help them organize and begin working. The SMEs for each MOS work together identifying and describing the knowledges required to perform the duties of their MOS based on documentation and their experience. Their work is documented on standard TKCAM worksheets. This process usually requires 2-3 days.

The second SME panel verifies the work of the first panel. This panel also is comprised of two NCOs for each MOS. The TKCAM Analyst briefs them on their role. They review the knowledges identified by the previous panel, correcting, adding, removing items as they consider appropriate based on their experience and documentation. This process usually requires 1-2 days.

After the second panel completes its work, the TKCAM Analyst takes the knowledges identified for each MOS and combines them into a master list. In addition, the analyst prepares task lists, usually the critical task lists, for each MOS. The "Knowledge Master List" and the critical task lists are used by the third SME panel which has responsibility for matching knowledges to the tasks whose performance requires the specific knowledge. This panel also is comprised of two NCOs for each MOS. Their work usually is completed in 1-2 days.

When the third SME panel has completed its work, the data collection phase of the TKCAM application is complete.

How is the analysis performed (Step 3.0)?

The TKCAM Analyst uses the data developed by the SME panels to perform analysis leading to an assessment of the feasibility of the proposed MOS restructuring. The knowledge data can be used to develop knowledge profiles of each MOS, that is, a listing of the knowledges and their relative importance to the MOS, and comparison matrices, which indicate both common and unique knowledges. Based on this information, a decision can be made with respect to the feasibility of restructuring the MOSs. The analyst can usually complete this work in 3-5 days.

What happens next (Step 4.0 and beyond)?

The TKCAM Analyst prepares a summary report documenting the findings. The results may be briefed to others. Based on the findings from the TKCAM application, a decision may be made to develop a MOCS proposal or to terminate the process.

ROLES AND RESPONSIBILITIES

Three main groups of participants are involved in a TKCAM application: the TKCAM Analyst, SMEs, and Army leadership.

The TKCAM Analyst

Usually a senior NCO in the personnel proponent office has the principal responsibility for applying TKCAM as the "TKCAM Analyst". The analyst is responsible for coordinating data collection, organizing the data, performing the analysis according to TKCAM procedures, making MOS consolidation recommendations, and reporting results and those recommendations to Army leadership.

Subject Matter Experts

SMEs provide most of the data and some of the analysis. Their input principally is through panels; group consensus is important since no one individual has the range and depth of experience to fully represent an MOS. The panels should be comprised of two senior enlisted personnel for each MOS under review. Warrant officers, for technical MOSs, and officers,

proponent analysts, and even vendor representatives might have roles as SMEs during some structuring actions. Each panel is chaired by the TKCAM Analyst, who provides leadership to the panel and who can make the final decision when disputes arise over MOS requirements and their implications for consolidation.

Two aspects of the composition of the SME panels are critical to the success of TKCAM analysis. Panel members must be committed to the process—that a systematic evaluation of the feasibility of an MOS structuring action, using knowledge as a major factor, provides useful information — even if they personally do not agree with the MOS structuring action under consideration.

Just as important, the panels must have continuity. Depending on the scope of the MOS action, the TKCAM process is designed to be accomplished in a matter of days. SMEs who start the process must finish their portion of it. While the qualifications of SMEs might be interchangeable, the individual soldiers are not. Changing the personnel who make up a panel during TKCAM can hinder the analysis.

Army Leadership

A successful TKCAM application depends upon active support from Army leadership before, during, and after the process. The leadership involved in a TKCAM application, depending upon the circumstances, may be the personnel proponent, the school commandant, or higher levels.

Before the application, the leadership needs to endorse the effort and endorse requests for SMEs to be detailed from their regular duty assignments for participation on the TKCAM panels. During the process, leadership must support the on-going effort insuring that facilities are available and personnel are not interrupted during their participation. Afterwards, the leadership needs to review and use the results as appropriate in making final decisions regarding any proposed MOS restructuring.

Table 1 lists the qualifications and responsibilities of the TKCAM Analyst, SMEs, and Army leadership. Since each MOS structuring action is different, the table should be considered a guideline for the minimum requirements for a successful TKCAM

Table 1

Qualifications and Responsibilities of TKCAM Participants

Participant	Qualifications	Responsibilities
TKCAM Analyst	NCO on personnel proponent staff. 2 years field experience in MOS under study. Prior experience analyzing MOS restructuring issues.	Organize TKCAM application - prepare work plan and arrange for subject matter experts. Orient SMEs and monitor their work. Prepare task lists for each MOS under study. Develop Knowledge Master List based on SME data. Develop MOS Knowledge Profiles and MOS Comparison Matrix. Analyze TKCAM data and develop commonality measures. Prepare TKCAM Summary Report.
SMEs	For enlisted MOSs: 2 senior NCOs per MOS for each of 3 SME Panels. 3 years field experience. Qualified field instructors preferred.	Participate on designated panels until released by TKCAM Analyst. Apply TKCAM procedures based on own knowledge and experience. Raise as issues any questions about the validity of the knowledges, procedures, or tasks used in the study.
Army Leadership		Provide support during the organization of the TKCAM study, particularly with respect to obtaining SMEs. Support the conduct of the TKCAM study including availability of facilities and related resources. Review the TKCAM Summary Report.

analysis. Ultimately, the analyst's decision about how to organize SME panels should be based on the understanding that the knowledges upon which the TKCAM operates should reflect the full breadth of knowledge required by the MOSs under study. Only those well acquainted with the needs of the MOSs *in the field* can provide that information.

HOW TO USE THIS MANUAL

This manual has been prepared as a step-by-step guide for the TKCAM Analyst. Analysts should first scan the entire manual to orient themselves to its content and format; then, they should read the manual developing an understanding of TKCAM concepts and procedures. This Introduction, Appendix C: Sample TKCAM Knowledges, and Appendix D: Sample TKCAM Analysis will be particularly valuable in this regard.

In performing a TKCAM study, the TKCAM Analyst should begin with the first step, following its guidance and procedures. Where SMEs are involved (Step 2.0), the analyst should understand the SME's responsibilities by reading the procedures and orient the SMEs using the briefing packages contained in the appendices. These packages have been designed to focus on what the SMEs need to know. Should SMEs have broader interests, they can read the manual.

ADDITIONAL INFORMATION

This manual has been prepared as a stand-alone reference for using TKCAM. No other documentation is required. If, however, additional information is wanted, refer to the following:

Akman, A. and Enwright, J. (1994). Early MOS structuring analysis handbook. Contract No. DASW01-94-C-0074. Silver Spring, MD: Akman Associates, Inc. User guide.

Akman, A. and Enwright, J. (1993). Application of military occupational specialty (MOS) decision support technology (DST) in determining the AFATDS operator MOS. Contract No. F33615-91-D-0010 0006. Silver Spring, MD: Akman Associates, Inc. Technical report.

Haught, D. and Enwright, J. (1991). Battlefield maintenance case study: task commonality analysis for system maintenance requirements. Alexandria, VA: U.S. Army Research Institute. Research Product 91-15.

In addition, various Army personnel proponent offices have used TKCAM since 1993. Points of contact may be identified through PERSCOM.

STEP 1.0
PREPARATION

OVERVIEW

The focus of this first step is organizing the TKCAM application. The work to be performed is largely the responsibility of the TKCAM Analyst. Once an understanding of the TKCAM concept and procedure has been developed, a work plan is prepared and arrangements are made for the SMEs, facilities, and resources needed to support a TKCAM application. Completion of this first step will result in the TKCAM effort having been organized. The TKCAM Analyst can then lead the way to data collection, analysis, and reporting the results of the TKCAM application.

REFERENCES AND DATA REQUIREMENTS

— Background information, memoranda, and other documentation underlying MOS restructuring issue.

— TKCAM User's Manual (particularly the Introduction, Appendix C, and Appendix E).

PRODUCTS

1. TKCAM Work Plan (Worksheet 1-1).

2. List of Subject Matter Experts (Worksheet 1-2).

PROCEDURES

1.1 Prepare TKCAM Work Plan.

1.2 Organize TKCAM Application.

These substeps generally are performed at the same time. Scheduling TKCAM activities (Step 1.1) is dependent on the availability of SMEs (Step 1.2) and vice-versa.

STEP 1.1
PREPARE TKCAM WORK PLAN

OVERVIEW

In this substep, the TKCAM Analyst develops a work plan for conducting the TKCAM application. The work plan identifies the major activities and milestones in the process. Once prepared, the analyst may use the plan to schedule, manage, and control the activities required for performing the analysis. In addition, the plan can be used to inform the analyst's supervisors of the plan of action as well as to orient SMEs and other interested parties on the steps that will be followed.

LEAD RESPONSIBILITY

TKCAM Analyst.

DATA REQUIREMENTS

— Background information, memoranda, and other documentation underlying MOS restructuring issues.

— TKCAM User's Manual (particularly the Introduction, Appendix C, and Appendix E).

SUPPLIES

— Worksheet 1-1, TKCAM Work Plan (blank copy).

PRODUCT

— TKCAM Work Plan (Worksheet 1-1).

ANALYST PROCEDURE

■ Develop an understanding of the MOS restructuring issues by reading and reviewing the background information, memoranda, and other documentation. Determine:

1. What are the MOS issues under consideration?
2. Why is the TKCAM study required?
3. What is the objective of the TKCAM study?
4. Who is the principal audience for the results?

Page ____ of ____	TKCAM WORKSHEET 1-1	Associated Worksheet(s)
	TKCAM Work Plan	1-2 Subject Matter Experts

OBJECTIVE: _____

ACTIVITIES AND MILESTONES

Step	Activity	Responsible Party	Start Date	Completion Date
1.1	Prepare TKCAM Work Plan	TKCAM Analyst		
1.2	Organize TKCAM Application	TKCAM Analyst		
2.1	Identify MOS Knowledges	SME Panel #1		
2.2	Verify MOS Knowledges	SME Panel #2		
2.3	Prepare Knowledge Master List	TKCAM Analyst		
2.4	Assemble Task Lists	TKCAM Analyst		
2.5	Match Knowledges to Tasks	SME Panel #3		
3.1	Develop MOS Knowledge Profiles	TKCAM Analyst		
3.2	Prepare MOS Comparison Matrix	TKCAM Analyst		
3.3	Compute MOS Commonality Measures	TKCAM Analyst		
3.4	Choose Restructuring Candidates	TKCAM Analyst		
4.0	Prepare TKCAM Summary Report	TKCAM Analyst		

NOTES:

Preparer's Name: Rank: MOS/AOC:	Date Prepared:

- Using Worksheet 1-1, record the "objective" of the TKCAM application. For example:

  To assess the feasibility of merging MOS xxx and MOS yyy.

- Develop an understanding of what TKCAM is by reading the TKCAM User's Manual, particularly the Introduction, Appendix C: Knowledge Guidelines, and Appendix E: Sample TKCAM Analysis. You should understand the following:

  1. What are TKCAM's basic concepts? Commonality analysis? Knowledge requirements? MOS comparison matrix?

  2. What are the four major steps in TKCAM? What is a typical scenario?

  3. Who are the major TKCAM participants and what are their roles?

- Complete TKCAM Worksheet 1-1 by entering "Start Dates" and "Completion Dates" for each activity.

  Suggestions for scheduling when 2-3 MOSs are being analyzed:

  — Step 2.1, Identify MOS Knowledges, conducted by SME Panel #1, typically takes 2-3 days.

  — Step 2.2, Verify MOS Knowledges, conducted by SME Panel #2, typically takes 1-2 days after Step 2.1 is completed.

  — Step 2.3, Prepare Knowledge Master List, usually takes the TKCAM Analyst 1-2 days after SME Panel #2 is completed.

  — Step 2.4, Assemble Task Lists, usually takes the TKCAM Analyst a few days and is done at the same time as Steps 1.1 through 2.3 are occurring.

— Step 2.5, Match Knowledges to Tasks, conducted by SME Panel #3, typically takes 1-2 days.

— Steps 3.1 through 4.0 typically take the TKCAM Analyst about a week.

The TKCAM Analyst usually needs a day or two between SME panels, that is, between Steps 2.1, 2.2, and 2.5, to review each panel's work and prepare copies for the next panel.

Specific dates for the SME panels may be dependent on the availability of personnel to serve on the panels.

If more than 2-3 MOSs are involved, a day or two more may be for the SME panels and more days may be required by the TKCAM Analyst inbetween SME panels in order to review and organize the worksheets for each succeeding panel.

STEP 1.2
ORGANIZE TKCAM APPLICATION

OVERVIEW

The purpose of this step is to organize the TKCAM application by arranging for SMEs, work space, clerical support, computers, reference material, and supplies, as required. When the TKCAM Analyst has completed this step, arrangements for all supporting facilities required to perform TKCAM and meet the project milestones should be in place.

LEAD RESPONSIBILITY

TKCAM Analyst.

DATA REQUIREMENTS

— Worksheet 1-1, TKCAM Work Plan.

SUPPLIES

— Worksheet 1-2, Subject Matter Experts (blank copy).

— Worksheet 1-3, TKCAM Printing Estimates (blank copy).

PRODUCTS

— Subject Matter Experts (Worksheet 1-2).

— TKCAM Printing Estimates (Worksheet 1-3).

— Conference room with work table and chairs.

— Copying facilities.

— Supplies.

— Access to personal computer with word processing, spreadsheet, and database management software.

— Clerical support for word processing and data entry.

— Reference material for each MOS.

Page ____ of ____

TKCAM WORKSHEET 1-2

Subject Matter Experts

Associated Worksheet(s)

1-1 TKCAM Work Plan

SME Panel #1

MOS	Rank/Name	Phone Nbr	Organization

SME Panel #2

MOS	Rank/Name	Phone Nbr	Organization

SME Panel #3

MOS	Rank/Name	Phone Nbr	Organization

Preparer's Name:

Rank:

MOS/AOC:

Date Prepared:

Page _____ of _____	**TKCAM WORKSHEET 1-3**	Associated Worksheet(s)
	TKCAM Printing Estimates	1-1 TKCAM Work Plan

FORM	FACTOR	QUANTITY
Worksheet 1-1, TKCAM Work Plan	1	_____
Worksheet 1-2, Subject Matter Experts	1	_____
Worksheet 1-3, TKCAM Printing Estimates	1	_____
Worksheet 2-1, MOS Knowledge	75/MOS	_____
Worksheet 2-2, Verify/Modify Knowledge	25/MOS	_____
Worksheet 2-3, Knowledge Master List	5/MOS	_____
Worksheet 2-4, MOS Task List	20/MOS	_____
Worksheet 3-1, MOS Knowledge Profile	5/MOS	_____
Worksheet 3-2, MOS Comparison Matrix	1/MOS PAIR	_____
Worksheet 3-3, MOS Commonality Measures	1/7 MOS PAIRS	_____
Appendix B: TKCAM SME Information Form	1/SME	_____
Appendix C: Knowledge Guidelines	1/SME	_____
Appendix D: Sample Knowledges	1/SME	_____
Appendix F: SME Panel #1 Orientation Briefing Package	1/PANEL #1 SME	_____
Appendix G: SME Panel #2 Orientation Briefing Package	1/PANEL #2 SME	_____
Appendix H: SME Panel #3 Orientation Briefing Package	1/PANEL #3 SME	_____
Step 2.1 SME Procedures Summary Sheet	1/MOS	_____
Step 2.2 SME Procedures Summary Sheet	1/MOS	_____
Step 2.5 SME Procedures Summary Sheet	1/MOS	_____

Notes to TKCAM Analyst:
1. "Factors" may be used to estimate total quantities; actual requirements may be different.
2. There will be additional copying needs during the TKCAM application.

Preparer's Name: Rank: MOS/AOC:	Date Prepared:

ANALYST PROCEDURE

- Arrange for SMEs to participate on the three TKCAM panels. 6 senior NCOs are required for each MOS included in the TKCAM study, 2 for each of three TKCAM panels. Refer to the Introduction for SME qualifications and requirements. Identify individuals who best meet the qualifications as SMEs and prepare notifications to be transmitted through appropriate channels.

  — Notification should state: (1) the purpose of the TKCAM application, (2) the role to be played by the SME (tailored to the particular panel to which the SME will be assigned), and (3) the projected dates of participation.

  — Upon confirmation of participation by SME, enter information on Worksheet 1-2, developing a roster of SMEs, their organizations, and phone numbers.

- Locate a conference room or other office-type space that can be used as a work room for the SME panels.

  — The "ideal" situation is a room, that can be set aside exclusively for the TKCAM participants, with tables and chairs arranged so that there is a separate work area for the SMEs representing each MOS. Chalkboards or easels, one for each MOS in the study, are often useful.

  — If not feasible, make the best arrangements possible. For instance, the TKCAM panels can meet around a table in the middle of the personnel proponent office.

- Arrange for access and use of a copier throughout the course of the TKCAM application.

- Assemble supplies (including pencils, markers, paper, and blank copies of TKCAM worksheets and other documentation).

  — Use Worksheet 1-3 to estimate approximate quantities of TKCAM worksheets and other documentation.

- Arrange access to personal computer with word processing, spreadsheet, and database management software.

  — None of TKCAM's procedures require the use of a computer; however, a computer can make preparation of some TKCAM documentation easier. For example, word processing can be used to convert hand-written worksheets from the panels into type-written worksheets that are neater and easier to use as project documentation.

- Arrange for clerical support.

  — Clerical support may be needed on a part-time, intermittent basis for copying and data entry throughout the TKCAM application, although such support is not a requirement.

  — Assistance may be particularly helpful after SME Panel #1 and #2 typing worksheets from those written by the SMEs and making copies for the next panel; also, during Step 3.0 and 4.0 clerical support may be helpful conducting the analysis, and preparing the summary report and briefing charts.

- Assemble reference material, including:

  — AR 611 series,

  — Programs of Instruction (POIs) for all skill levels,

  — Soldier's manuals (SMs),

  — Equipment operating and maintenance manuals,

  — Critical task lists (CTLs),

  — Background information about the restructuring,

  — TKCAM User's Manual for reference,

  — Among others.

STEP 2.0
DATA COLLECTION

OVERVIEW

This step assembles the data sets needed to perform commonality analysis on potential MOS restructurings. Data sets prepared in this step are a list of all the knowledge requirements for all the MOSs under study, and current MOS task lists, usually consisting of critical tasks, for each MOS. These data are developed by the TKCAM Analyst and SMEs.

REFERENCES AND DATA REQUIREMENTS

— AR 611-201 Enlisted Career Management Fields and Military Occupational Specialties.

— Critical task lists (CTLs) for each MOS.

— POIs for all skill levels of each MOS.

— SMs for each MOS.

PRODUCTS

1. Verified Knowledge Master List, a listing of the knowledge requirements for all the MOSs under study (Worksheet 2-3).
2. Task lists for each MOS under study (Worksheet 2-4).
3. Knowledge-to-task matches for each MOS (Worksheet 2-4).

PROCEDURES

2.1 Identify MOS Knowledges.

2.2 Verify MOS Knowledges.

2.3 Prepare Knowledge Master List.

2.4 Assemble Task Lists.

2.5 Match Knowledges to Tasks.

Except for Step 2.4, these steps are performed sequentially. Step 2.4 can be performed by the TKCAM Analyst while Step 2.1 and Step 2.2 are being done.

STEP 2.1
IDENTIFY MOS KNOWLEDGES

OVERVIEW

The purpose of this substep is to develop a list and briefly describe the knowledges required to perform the duties and responsibilities of each of the MOSs under consideration for restructuring. This is principally accomplished by SMEs, two for each MOS, who work together. The TKCAM Analyst organizes a panel of SMEs, briefs its members with respect to their task, that is, performing this Step 2.1, and monitors their work. The SMEs review available source material and their own experiences to identify and describe the "knowledges required to perform their jobs." They record their information using copies of Worksheet 2-1, one for each knowledge.

LEAD RESPONSIBILITY

SME Panel #1. Two SMEs for each MOS under study. See the Roles and Responsibilities section of the Introduction to determine the level of experience that these SMEs have.

DATA REQUIREMENTS

— AR 611-201, Enlisted Career Management Fields and Military Occupational Specialties.

— POIs for all skill levels of each MOS.

— SMs for each MOS.

SUPPLIES

— Appendix B: TKCAM Subject Matter Expert Information Form (copy for each SME).

— Appendix C: Knowledge Guidelines (copy for each SME).

— Appendix D: Sample Knowledges (copy for each SME).

— Appendix F: SME Panel #1 Orientation Briefing Package (copy for each SME).

Page ____ of ____	**TKCAM WORKSHEET 2-1**	Associated Worksheet(s):
	MOS Knowledge	2-2 Verify/Modify Knowledge 2-3 Knowledge Master List

ID Number: _____ (To be completed by TKCAM Analyst)

Source MOS: _____

Skill Level: _____ (1, 2, 3, or 4)

Source Document(s): _____ Page: _____

Title: _____

Suggestions for writing "Title":

1. Identify knowledge required --- what does the soldier need to know.
2. Do not describe what the soldier does --- that is, DO NOT WRITE TASK STATEMENTS.

Description:

(Select one if applicable) ☐ Knowledge of: ☐ Understanding of: ☐ Principles of:

_____

_____

_____

_____

_____

_____

_____

_____

Example: Fundamentals of Electricity

An understanding of voltage, current, resistance, and use of Ohm's Law; use of electrical circuit components; electrical schematics and electrical symbols.

Preparer's Name: Rank: MOS/AOC:	Date Prepared:

TKCAM STEP 2.1
SME PROCEDURES
SUMMARY SHEET

Identify MOS Knowledges

☐ 1. Participate in SME Panel #1 Orientation Briefing.
Complete TKCAM SME Information Form (Appendix B).

☐ 2. Review Appendix C: Knowledge Guidelines and
Appendix D: Sample Knowledges.

☐ 3. Collect and Review Source Material --- POIs, SMs, TMs, etc.

☐ 4. Develop Initial List of Knowledges --- Write "Titles" and "Sources" Only.

Hints:

▸When identifying/listing knowledges:

a. Think first in terms of theory (for example, Basic Mathematics), then method (for example, PMCS), and then objects (for example, Technical Publications)

b. For each category (theory, method, object), identify knowledges by reviewing documentation and the sample knowledges (Appendix C). Also, draw on your experience --- what does the soldier with your MOS need to know?

▸When writing titles:

a. State subject or function first.
For example, "PMCS", "Basic Mathematics";
Then, state qualifiers, if any.
For example, "PMCS Avenger".

b. Identify knowledge required --- what does the soldier need to know?

c. Do not describe what the soldier does --- that is, do no write task statements.

☐ 5. Review Initial List for Completeness (Draw on Your Experience).
Add any additional enabling criteria to the initial list.

☐ 6. Using Worksheet 2-1 for Each Knowledge, Write Description.

Hint:

▸When writing description, begin with phrase such as:
Knowledge of.....
Understanding of.....
Principles of.....

☐ 7. When All Knowledges Have Been Described on Worksheets 2-1,
Turn In to TKCAM Analyst for Review.

— Worksheet 2-1, MOS Knowledge (75 blank copies per MOS).

— TKCAM Step 2.1 SME Procedures Summary Sheet (copy for each SME).

PRODUCT

— Initial set of knowledges for each MOS under study (Worksheet 2-1).

ANALYST PROCEDURE

- Collect for each MOS under study the documents and lists indicated under "Data Requirements".
- Assemble SMEs meeting the requirements described under "Roles and Responsibilities" in the Introduction.
- Present SME Panel #1 Orientation Briefing (See Appendix F); handout briefing charts, reference material, supplies, and procedures summary sheet to SMEs.
- Monitor SME work, reviewing the initial list of knowledges for each MOS, reviewing Worksheets 2-1 as they are prepared by SME, and review all SME work before concluding SME Panel #1.
- Maintain the files of worksheets and other references needed in this step.

SME PROCEDURE

- Participate in the orientation briefing for SME Panel #1 presented by the TKCAM Analyst. Understand the following:

  1. The purpose of SME Panel #1, that is, what is your job?
  2. What "Knowledge" is in TKCAM and how this concept is used.
  3. How to identify knowledges, that is, develop an initial list of knowledges.
  4. How to document knowledges for use in TKCAM, that is, completing Worksheets 2-1.

  Complete TKCAM Subject Matter Expert Information Form (Appendix B) and submit to TKCAM Analyst.

- Review the Knowledge Guidelines (Appendix C) to develop an understanding of what "knowledges" are in TKCAM and how to develop them.

- Review the Sample Knowledges (Appendix D). After scanning the list, look at it a second time, circling any knowledges which may be applicable to the MOSs under study.

- Assemble for each MOS under study the referenced materials (SMs, POIs, etc.).

- Think about the POIs and other references in terms of how this material may be used to identify and express knowledge requirements of the MOSs under study.

- SMEs for each MOS should write down an initial list of knowledges on a writing pad. List "Titles" and "Sources" only. In developing the list, draw on the reference material, the sample list, and field experience.

NOTE

The number of knowledges contributed to the Knowledge Master List by any one MOS typically can range from 20 to 70. More technically oriented MOSs might contribute more; clerical MOSs fewer. Some MOSs might use the same knowledges.

- Review the initial list with the TKCAM Analyst and consider whether there are any omissions. If so, the additional knowledges should be added to the list.

- For each knowledge on the list, fill out Worksheet 2-1.

  1. Leave "ID Number" blank; this will be filled out later by the TKCAM Analyst.

  2. Record the "Source MOS", "Skill Level", "Source Document(s)", and "Page", if any.

     — The "Source MOS" is the MOS with which the knowledge is associated. Usually, this will be the SME's MOS.

     — The "Skill Level" should be the lowest skill at which the knowledge is required; if uncertain or unknown, estimate the skill level.

     — "Source Document(s)" is the reference from which the knowledge is derived such as a POI or SM; this may also be derived from the "SME's experience".

3. Write the "Title". BE BRIEF. Identify the knowledge required --- what does the soldier need to know. Do not describe what the soldier does --- that is, DO NOT WRITE TASK STATEMENTS.

   State the subject or function first such as "PMCS" or "Map Reading". Then, state qualifiers, if any, such as "PMCS Avenger".

   Usually, the qualifier should be avoided. In this case, knowing the principles and procedures required for PMCS is one knowledge and knowing the components and subsystems of Avenger is another. Instead of combining these, there may really be two knowledges: "PMCS" and "Avenger".

4. Write a brief description of the knowledge. Often, beginning a description with phrases such as "Knowledge of...", "Understanding of...", or "Principles of..." helps writing good descriptions and avoiding task statements. If helpful, use one of the beginning phrases on the worksheet by checking the appropriate box.

- After the first hour or so of completing Worksheets 2-1, the worksheets should be circulated among panel members and the TKCAM Analyst to ensure that all SMEs are describing knowledges using a common approach and common language.

- When all knowledges have been identified and described on Worksheets 2-1, the worksheets should be provided to the TKCAM Analyst for final review. When the documentation appears complete, the TKCAM Analyst may release the SMEs allowing them to return to regular duties.

STEP 2.2
VERIFY MOS KNOWLEDGES

OVERVIEW

The purpose of this step is to verify the knowledges identified and described on Worksheets 2-1 for all MOSs included in the study. In addition, duplicate knowledges will be eliminated and, where useful, knowledges will be combined. SMEs review the draft knowledges (Worksheets 2-1) to:

1. Ensure completeness and accuracy;
2. Ensure the knowledges have the same basic level of detail;
3. Ensure knowledges, based on their descriptions, do not overlap.

LEAD RESPONSIBILITY

SME Panel #2. Two SMEs representing each MOS under study. See the Roles and Responsibilities section of the Introduction to determine the experience that these SMEs should bring to the process.

The SMEs who helped to develop the initial set of knowledges in Step 2.1 cannot *also verify them in this step. A different group of SMEs, having similar qualifications, must perform the verification.*

DATA REQUIREMENTS

— A copy of all completed Worksheets 2-1 organized by MOS, from Step 2.1 (retain originals for project files).

— POIs for all skill levels of each MOS.

— SMs for each MOS.

SUPPLIES

— Appendix B: TKCAM Subject Matter Expert Information Form (copy for each SME).

— Appendix C: Knowledge Guidelines (copy for each SME).

— Appendix D: Sample Knowledges (copy for each SME).

— Appendix G: SME Panel #2 Orientation Briefing Package (copy for each SME).

— Worksheet 2-2, Verify/Modify Knowledge (25 blank copies per MOS).

— TKCAM Step 2.2 SME Procedures Summary Sheet (copy for each SME).

PRODUCT

— Verified set of knowledges for all MOSs (Worksheets 2-1 and Worksheets 2-2).

ANALYST PROCEDURE

- Collect and organize for each MOS under study the documents and worksheets indicated under "Data Requirements".
- Assemble SMEs meeting the requirements described under "Roles and Responsibilities" in the Introduction.
- Present SME Panel #2 Orientation Briefing (See Appendix G); handout briefing charts, reference material, supplies, and procedures summary sheet to SMEs.
- Monitor SME use of the TKCAM procedures.
- Maintain the files of worksheets and other references needed in this step.
- Make final decisions on the knowledges based on recommendations of the SME reviewers.

Page _____ of _____	**TKCAM WORKSHEET 2-2**	Associated Worksheet(s): 2-1 MOS Knowledge 2-3 Knowledge Master List
	Verify/Modify Knowledge	

ID Number: _____ (To be completed by TKCAM Analyst)

From Worksheet 2-1, enter:

Source MOS: _____

Title: _____

Change Worksheet 2-1 as indicated: ☐ Title ☐ Description ☐ Other (Indicate Below)

Modify Worksheet(s) 2-1 as follows: ☐ Combine Knowledges (WS 2-1); Revise/rewrite title and description. ☐ Delete

STAPLE WORKSHEET(S) 2-1 BEHIND THIS WORKSHEET.

Reason(s) for Change: _____

_____

_____

Revised Title: _____

Suggestions for writing "Title":

1. Identify knowledge required --- what does the soldier need to know.
2. Do not describe what the soldier does --- that is, DO NOT WRITE TASK STATEMENTS.

Revised Description:

(Select one if applicable) ☐ Knowledge of: ☐ Understanding of: ☐ Principles of:

_____

_____

_____

_____

Example: Fundamentals of Electricity

An understanding of voltage, current, resistance, and use of Ohm's Law; use of electrical circuit components; electrical schematics and electrical symbols.

Preparer's Name: Rank: MOS/AOC:	Date Prepared:

TKCAM STEP 2.2
SME PROCEDURES
SUMMARY SHEET

Verify MOS Knowledges

☐ 1. Participate in SME Panel #2 Orientation Briefing.
Complete TKCAM SME Information Form (Appendix B).

☐ 2. Review Appendix C: Knowledge Guidelines and
Appendix D: Sample Knowledges.

☐ 3. Collect and Review Source Material --- POIs, SMs, TMs, etc.

☐ 4. Review TKCAM Worksheets 2-1 for Completeness (1st Pass).

Hints:

- ▸ Review each worksheet verifying an entry for Source MOS, Skill Level, Source Document, Page, Title, and Description.
- ▸ Enter any missing items.

☐ 5. Review Set of Knowledges for Omissions (2nd Pass).
Complete Worksheet 2-1 for Any Additional Knowledges.

Hints:

- ▸ Review source material such as POIs.
- ▸ Think about what the soldier needs to know to perform his job.

☐ 6. Review Worksheets 2-1 for Consistency and Accuracy (3rd Pass).
Document Changes on Worksheet 2-2.

Hints:

- ▸ Read each title and description making sure they state a "knowledge" and do not describe a task.
- ▸ Check descriptions to see if they begin with words like "Knowledge of...", "Understanding of...", "Principles of...", or similar words.

☐ 7. Review Worksheets 2-1 for Similar or Related Knowledges (4th Pass).
Consider Combining into a Single Knowledge.
Use Worksheet 2-2 to Re-Write; Attach Worksheets 2-1.

☐ 8. Review Worksheets 2-1 for Duplication (5th Pass).
Delete Duplicate Knowledges using Worksheet 2-2.

Note: #4, 5, and 6 should be performed by MOS subpanels.
#7 and #8 should be performed by the SME panel as a group
or by a subgroup with representatives for each MOS.

SME PROCEDURE

- Participate in the orientation briefing for SME Panel #2 presented by the TKCAM Analyst. Understand the following:

  1. The purpose of SME Panel #2, that is, what is your job?

  2. What "Knowledge" is in TKCAM and how this concept is used.

  3. How to review and verify the knowledges described on Worksheets 2-1.

  4. How to determine the completeness and accuracy of knowledges described on Worksheets 2-1.

  Complete TKCAM Subject Matter Expert Information Form (Appendix B) and submit to TKCAM Analyst.

- Review the Knowledge Guidelines (Appendix C) to develop an understanding of what "knowledges" are in TKCAM and how they may be verified.

- Scan the Sample Knowledges (Appendix D) to get an idea of how titles and descriptions of TKCAM knowledges are written.

- Working in subgroups by MOS:

  1. Review the Worksheets 2-1 for your MOS and determine whether the worksheets are complete. For each knowledge, there should be an entry for Source MOS, Skill Level, Source Document, Page, Title, and Description. Any missing items should be added.

  2. Review the knowledges (Worksheets 2-1) that were derived for your MOS for <u>completeness</u>, that is, are any knowledges missing? Refer to your MOS's source material (POIs, SMs, TMs, etc.) and draw upon your field experience.

     — Add Worksheets 2-1 to document any additional knowledges (See Step 2.1 procedures for guidelines to complete Worksheet 2-1).

3. Review the knowledges (Worksheets 2-1) that were derived for your MOS for consistency, level of detail, exclusivity, and accuracy.

   — First, examine the titles of the knowledges.

   — Next, review the descriptions.

   You should focus on the following:

   1. ***Consistency and level of detail***: Each knowledge should address a single concept. Each also should have basically the same level of detail. Furthermore, they should not be so detailed that a new knowledge is needed for every possible task action. For example, while it is true that troubleshooting the electrical system of a missile system is a different task than troubleshooting the electrical system of a motor vehicle, the major differences are equipment specific. The fundamental troubleshooting methods and tools are similar enough that an Electrical Troubleshooting knowledge might be sufficient to cover the troubleshooting knowledge requirements of both tasks.

   2. ***Exclusivity***: Knowledges should be relatively independent of one another. For example, a knowledge entitled Basic Mathematics might cover simple algebra as well as arithmetic (addition, multiplication, etc.). But it is more useful to TKCAM analysis to have separate knowledges: Basic Algebra and Basic Arithmetic because they better describe the job knowledge requirements and better discriminate between jobs.

   3. ***Accuracy***: The titles, descriptions and other information associated with the knowledges should accurately reflect the knowledge used by the MOSs under study.

- Recommend changes to the knowledges by completing a Worksheet 2-2 for each knowledge you believe should be changed. In filling out Worksheet 2-2:

  1. Leave the "ID Number" blank; this will be filled in later by the TKCAM Analyst.

2. Record the Source MOS and Title from Worksheet 2-1; if combining two or more, record the Source MOS and Title from one of the knowledges.

3. Mark in the boxes on Worksheet 2-2 all of the types of changes that apply. Several might apply to a single knowledge.

4. In the space provided, briefly state the "Reason(s) for Change", for example, "Duplicate knowledges."

5. Enter the revised information - a different title and/or description. A change in one element may not require changes in any other. Enter only changes. Follow the rules for writing titles and descriptions of knowledges.

   Note: Space has not been provided on Worksheet 2-2 for changing skill level or source, changes which rarely occur. If such a change needs to be made, simply cross out the information on Worksheet 1-1 and enter the correct information.

- The panel as a whole should review all the Worksheets 2-1 and 2-2 for all MOSs included in the study to identify any similar knowledges that might be combined or others that are not appropriate and should be deleted.

  1. If two or more knowledges on Worksheets 2-1 are similar or the same, recommend combining them by checking the appropriate box on Worksheet 2-2, entering their MOSs and titles from Worksheet 2-1, and writing a new title and description in the space provided. Attach the Worksheets 2-1 behind the Worksheet 2-2.

  2. Recommend deletion of knowledges that are inappropriate because, for example, they are no longer used, are related to functions no longer performed, or for any other appropriate reason. Also recommend deletion of those that seem to be redundant. Check the Delete box on Worksheet 2-2 and write a justification in the space marked "Reason(s) for Change".

- When all Worksheets 2-1 have been reviewed and all changes have been recorded on Worksheets 2-2, the worksheets should be provided to the TKCAM Analyst for final review. When the documentation appears complete, the TKCAM Analyst may release the SMEs allowing them to return to their regular duties.

STEP 2.3
PREPARE KNOWLEDGE MASTER LIST

OVERVIEW

The purpose of this step is to prepare the Knowledge Master List which is a listing of all knowledges verified by SME Panel #2 and approved by the TKCAM Analyst. The list shows for each knowledge its identification number, title, and description. All completed Worksheets 2-1 and 2-2 are used to prepare this list.

LEAD RESPONSIBILITY

TKCAM Analyst.

DATA REQUIREMENTS

— Copies of Worksheets 2-1, MOS Knowledge, and Worksheets 2-2, Verify/Modify Knowledge, from Step 2.2 (retain originals for project files).

SUPPLIES

— Worksheet 2-3, Knowledge Master List (blank copies).

RESOURCE REQUIREMENTS

— Personal computer with word processing and database management software.

PRODUCT

— Knowledge Master List (Worksheet 2-3).

ANALYST PROCEDURE

- Assemble Worksheets 2-1 and Worksheets 2-2 that have been reviewed by SME Panel #2.
- Review Worksheets 2-2; approve recommended changes. Changes proposed by SME Panel #2 that are not acceptable should be reviewed with the responsible SMEs and differences resolved so that a final set of knowledges can be agreed upon.

Page _____ of _____

TKCAM WORKSHEET 2-3

Knowledge Master List

Associated Worksheet(s)

2-1 MOS Knowledge

2-2 Verify/Modify Knowledge

ID Number	Title	Description

Preparer's Name:

Rank:

MOS/AOC:

Date Prepared:

- Prepare Knowledge Master List using Worksheet 2-3.

  — Organize all Worksheets 2-1 and 2-2 into a logical sequence. For example, group knowledges pertaining to general principles first, then procedures or methods next, and specific equipment, if any. Alternately, the knowledges could be organized alphabetically by title or keyword. Choose a sequence that would make finding specific knowledges on the list the easiest.

  — When the worksheets have been put in order, assign an unique "ID Number" to each sheet beginning with "1".

  — Prepare a list of all knowledges using Worksheet 2-3. List the ID Number, Title, and Description for each, copying the information from Worksheets 2-1, if unchanged in Step 2.2, or from Worksheets 2-2, if revised.

  Note: Instead of using Worksheet 2-3, the Knowledge Master List may be typed with a typewriter or word processor on plain paper. Simply follow the format shown in the worksheet. This approach may require fewer pages.

STEP 2.4
ASSEMBLE TASK LISTS

OVERVIEW

The purpose of this step is to prepare for each MOS under study a list of tasks that represent the core duties or functions of the MOS. Often, the critical task list or a subset of critical tasks, if available, is used. The task data are assembled by the TKCAM Analyst while the preceding steps are occurring and are formatted using Worksheet 2-4. In this form, the task data can be combined with the knowledge data in succeeding steps to develop knowledge profiles and comparisons of the MOSs under study.

LEAD RESPONSIBILITY

TKCAM Analyst.

DATA REQUIREMENTS

— Critical task lists (CTLs) for each MOS.

— POIs for all skill levels of each MOS.

— SMs for each MOS.

SUPPLIES

— Worksheet 2-4, MOS Task List (20 blank copies per MOS).

RESOURCE REQUIREMENTS

— Personal computer with word processing and database management software.

PRODUCT

— Task list for each MOS under study (Worksheets 2-4).

DEFINITION AND EXPLANATION

A task is considered a *critical task* if:

> ". . . failure to accomplish it in accordance with system requirements would result in adverse effects on system reliability, efficiency, effectiveness, safety, or cost. A task is also to be designated as critical whenever system design characteristics approach human limitations, and thereby,

Page ___ of ___	TKCAM WORKSHEET 2-4 MOS Task List	Associated Worksheet(s) 2-3 Knowledge Master List

MOS: ______

Source(s): ____________________

- - - - - - - - - - - - - - - - - - - -

Task Number: __________ Skill Level: ______ Knowledges (ID Number) ___ ___ ___ ___ ___

Task Title: ____________________ ___ ___ ___ ___ ___

- - - - - - - - - - - - - - - - - - - -

Task Number: __________ Skill Level: ______ Knowledges (ID Number) ___ ___ ___ ___ ___

Task Title: ____________________ ___ ___ ___ ___ ___

- - - - - - - - - - - - - - - - - - - -

Task Number: __________ Skill Level: ______ Knowledges (ID Number) ___ ___ ___ ___ ___

Task Title: ____________________ ___ ___ ___ ___ ___

- - - - - - - - - - - - - - - - - - - -

Task Number: __________ Skill Level: ______ Knowledges (ID Number) ___ ___ ___ ___ ___

Task Title: ____________________ ___ ___ ___ ___ ___

- - - - - - - - - - - - - - - - - - - -

Task Number: __________ Skill Level: ______ Knowledges (ID Number) ___ ___ ___ ___ ___

Task Title: ____________________ ___ ___ ___ ___ ___

- - - - - - - - - - - - - - - - - - - -

Task Number: __________ Skill Level: ______ Knowledges (ID Number) ___ ___ ___ ___ ___

Task Title: ____________________ ___ ___ ___ ___ ___

- - - - - - - - - - - - - - - - - - - -

Task Number: __________ Skill Level: ______ Knowledges (ID Number) ___ ___ ___ ___ ___

Task Title: ____________________ ___ ___ ___ ___ ___

- - - - - - - - - - - - - - - - - - - -

Task Number: __________ Skill Level: ______ Knowledges (ID Number) ___ ___ ___ ___ ___

Task Title: ____________________ ___ ___ ___ ___ ___

Preparer's Name: Rank: MOS/AOC:	Date Prepared:

significantly increase the likelihood of degraded, delayed, or otherwise impaired mission performance." (MIL-STD-1478, pg. 3.)

Critical tasks, which are a subset of an MOS's total tasks, are used to focus TKCAM analysis on only those elements of that MOS's duties that are most important and most definitive. The point of the analysis is to describe the degree to which MOSs differ in order to be able to make decisions about whether they can be consolidated. Those that differ too much should not be consolidated. By basing its analysis on primarily critical tasks, TKCAM ensures that differences between MOSs—those on which decisions are made—are operationally significant. Moreover, these are the tasks that best define the duties of an MOS. All MOSs share a set of soldier tasks; shared tasks do not illuminate differences between those MOSs. They only confirm similarities that are irrelevant to the decision to consolidate or not consolidate MOSs.

Critical task lists for MOSs are not always available. And there generally are no such lists for equipment systems. An MOS's annotated task list—a comprehensive list of that MOS's tasks, including soldier tasks—should be used when a critical task list is not available. Apply the definition of critical task (above) to the annotated task list to determine that subset of tasks that is most important to the MOS.

ANALYST PROCEDURE

- Collect for each MOS the documents and lists indicated under "Data Requirements".
- Assemble a task list for each MOS. If available, use the CTL. Review its content for its accuracy, making modifications if necessary. If there is no CTL, extract core tasks from an annotated task list or other source material.
- Using Worksheet 2-4, enter the MOS identifier and Source of the task list at the top of the first page. To avoid confusion, the MOS identifier should be entered on all additional pages listing tasks for the MOS; repeating the Source is not necessary.

- Record the tasks for each MOS on a set of Worksheets 2-4, listing for each task the Task Number (ten digit identification number in the format XXX-XXX-XXXX), Skill Level, and Task Title.

  Note: The Knowledge spaces to the right of the Task Title on Worksheet 2-4 will be used in Step 2.5 by SME Panel #3 to record the knowledges associated with each task on the list.

  Note: Instead of using Worksheet 2-4, the MOS Task List may be typed with a typewriter or word processor on plain paper. Simply follow the format shown in the worksheet. This approach may require fewer pages.

STEP 2.5
MATCH KNOWLEDGES TO TASKS

OVERVIEW

The purpose of this procedure is to select the knowledges that are most important for performing each MOS task. SMEs, using the Knowledge Master List, review the tasks, identify the knowledges required to perform each task, and record the "ID Number" of the knowledges besides the tasks listed on Worksheet 2-4. These data will be used by the TKCAM Analyst in later steps to develop a knowledge profile for each MOS and analyze the commonalities and differences with respect to the knowledges required to perform the tasks of each MOS included in the study.

LEAD RESPONSIBILITY

SME Panel #3. Two SMEs representing each MOS under study. See the Roles and Responsibilities section of the Introduction to determine the experience that these SMEs should bring to the process.

The SMEs who participated in Step 2.1 and Step 2.2 cannot *also serve on the panel in this step. A different group of SMEs, having similar qualifications, must perform this step.*

DATA REQUIREMENTS

— Copies of Worksheets 2-3, Knowledge Master List, from Step 2.3 for SMEs representing each MOS (retain original worksheets for project files).

— POIs for all skill levels for each MOS.

— SMs for all skill levels for each MOS.

SUPPLIES

— Appendix B: TKCAM Subject Matter Expert Information Form (copy for each SME).

— Appendix C: Knowledge Guidelines (copy for each SME).

— Appendix H: SME Panel #3 Orientation Briefing Package (copy for each SME).

— Copies of Worksheets 2-4, MOS Task List, from Step 2.4, one set for each MOS (retain original worksheets for project files).

— TKCAM Step 2.5 SME Procedures Summary Sheet (copy for each SME).

PRODUCT

— Completed Worksheets 2-4, MOS Task List, for each MOS in the study showing knowledges required to perform each task.

ANALYST PROCEDURE

- Collect and organize for each MOS under study the documents and worksheets indicated under "Data Requirements".
- Assemble SMEs meeting the requirements described under "Roles and Responsibilities" in the Introduction.
- Present SME Panel #3 Orientation Briefing (See Appendix H); handout briefing charts, reference material, supplies, and procedures summary sheet to SMEs.
- Monitor SME use of the TKCAM procedures.
- Maintain the files of worksheets and other references needed in this step.
- Make final decisions on task-knowledge matches if the SMEs cannot resolve differences.

SME PROCEDURE

- Participate in the orientation briefing for SME Panel #3 presented by the TKCAM Analyst. Understand the following:

  1. The purpose of SME Panel #3, that is, what is your job?
  2. What "Knowledge" is in TKCAM and how this concept is used.
  3. How to match knowledges from the Knowledge Master List (Worksheet 2-3) to tasks (Worksheet 2-4).

TKCAM STEP 2.5
SME PROCEDURES
SUMMARY SHEET

Match Knowledges to Tasks

- [ ] 1. Participate in SME Panel #3 Orientation Briefing. Complete TKCAM SME Information Form (Appendix B).
- [ ] 2. Review Appendix C: Knowledge Guidelines.
- [ ] 3. Working with Worksheet 2-4, review the first task.
- [ ] 4. For this task, identify all the knowledges on the Knowledge Master List (Worksheet 2-3) that are required to perform the task and record their ID Numbers to the right of the Task Title on Worksheet 2-4.

  Hints:

  - ▸ More than one knowledge may apply to a single task. Choose all those that are required.
  - ▸ Review each task independently; assign only the knowledges required to perform the specific task.
  - ▸ Focus on the knowledge one needs to perform the task.

- [ ] 5. Repeat the preceding two steps for each task on Worksheet 2-4.
- [ ] 6. If there is a knowledge required that is not included on the Knowledge Master List, discuss the omission with the TKCAM Analyst.

Complete TKCAM Subject Matter Expert Information Form (Appendix B) and submit to TKCAM Analyst.

- Review the Knowledge Guidelines (Appendix C) to develop an understanding of what "knowledges" are in TKCAM and how to match them to tasks.

- Working in MOS teams and using the Knowledge Master List for reference, identify all of the knowledges needed to perform the tasks in the lists given to you. Record the "ID Number" of the knowledges on the task lists (Worksheet 2-4) next to the tasks for which they are required.

- Review each task independently. Ignore the other tasks on the list and associated tasks that may not be on the list. For example, if a maintenance task is "Replace Item A", assign only those knowledges that are required to *replace* the item. Do not record those needed to first remove Item A, even though that is the task that would logically precede the "replace" task.

  Also when reviewing the tasks, think about any tools, manuals, or special equipment that are needed to perform the tasks. The knowledges that apply to those are part of the task's knowledge requirements as well.

NOTE

Keep in mind the difference between the background knowledge one needs to *learn* a task and the task-relevant knowledge one needs to *perform* the task once it has been learned. Record only those enabling criteria needed to perform the task.

- More than one knowledge may apply to a single task. Choose those providing the greatest detail.

- If you think of knowledges that do not appear on the Knowledge Master List (Worksheet 2-3), discuss the omission with the TKCAM Analyst. If the TKCAM Analyst approves, the knowledge will be added to the master list and an ID Number will be assigned for subsequent use.

- Continue until knowledges have been identified for all tasks on Worksheet 2-4.

STEP 3.0
ANALYSIS

OVERVIEW

In this step, the TKCAM Analyst analyzes the data developed in the previous steps. The purpose is to determine how much commonality in terms of knowledges exists between pairs and combinations of MOSs included in the study. MOSs that require many of the same knowledges to perform their tasks can be considered as candidates for restructuring while MOSs having little in common may not be suitable for restructuring --- at least based on the single criterion of "knowledge required."

REFERENCES AND DATA REQUIREMENTS

— Knowledge Master List (Completed Worksheet 2-3 from Step 2.3).

— Knowledge-to-task matches for each MOS under study (Completed Worksheets 2-4 from Step 2.5).

— POIs for all skill levels for each MOS.

— SMs for all skill levels for each MOS.

PRODUCTS

1. Knowledge profiles for each MOS under study (Worksheet 3-1).
2. A comparison matrix for each possible MOS-to-MOS comparison (Worksheet 3-2).
3. Identification of potential candidates for MOS restructuring.

PROCEDURES

3.1 Develop MOS Knowledge Profiles.

3.2 Prepare MOS Comparison Matrix.

3.3 Compute MOS Commonality Measures.

3.4 Choose Restructuring Candidates.

These steps are performed sequentially.

STEP 3.1
DEVELOP MOS KNOWLEDGE PROFILES

OVERVIEW

In this substep, the TKCAM Analyst develops a "knowledge profile" for each MOS in the study. The knowledge profile is a listing of the knowledges used by the MOS along with a count and ranking of the number of tasks requiring each knowledge. These profiles will be used in building the MOS comparison matrix, which is the main TKCAM product for assessing the commonality between MOSs.

The analyst's task is to list the knowledges used by an MOS and count the number of that MOS' tasks in which each knowledge is used. Then, the analyst assigns a rank to each knowledge indicating its relative value to the MOS in terms of the number of tasks in which it is used. For example, a knowledge used in the most tasks receives a rank of "1", while those knowledges used in just a few tasks would be assigned a low ranking.

LEAD RESPONSIBILITY

— TKCAM Analyst.

DATA REQUIREMENTS

— Knowledge Master List (Worksheet 2-3).

— MOS task lists with knowledges (Worksheets 2-4).

SUPPLIES

— Worksheet 3-1, MOS Knowledge Profile (1 or more blank copies for each MOS, depending upon number of knowledges).

PRODUCT

— MOS Knowledge Profiles for each MOS included in study (Worksheets 3-1).

Page _____ of _____

TKCAM WORKSHEET 3-1

MOS Knowledge Profile

Associated Worksheets:

2-3 Knowledge Master List

2-4 MOS Task List

3-2 MOS Comparison Matrix

MOS: _____

Total Number of Knowledges for this MOS: _____

ID Number	Knowledge	Number of Tasks	Rank

Preparer's Name:

Rank:

MOS/AOC:

Date Prepared:

ANALYST PROCEDURE

- Write the identifier of an MOS at the top of a blank Worksheet 3-1, MOS Knowledge Profile.

- Find the completed task list with knowledges for that MOS (Worksheet 2-4 from Step 2.5).

- List on Worksheet 3-1, in order of "ID Number", all of the knowledges that appear in tasks performed by that MOS. List each knowledge only once. For instance, if a knowledge is listed as needed to perform several different tasks for an MOS, it should be written just once on that MOS's Worksheet 3-1. To complete this step, you will have to scan Worksheet 2-4 repeatedly until you have found all the occurrences of different knowledges. If there are more than 25 knowledges used by the MOS, you will have to use additional worksheets.

- Still using Worksheet 2-4, count the number of tasks that use the first knowledge now listed on Worksheet 3-1. You will have to review the knowledges assigned to *each* task. Write that number next to the knowledge under "Number of Tasks".

  Repeat for each knowledge listed on Worksheet 3-1 until you have counted the number of tasks used by each knowledge.

- Rank order the knowledges on the worksheet according to the following rules:

  1. Give the highest rank, "1", to the knowledge that is required to perform the most tasks in the MOS.

  2. Give the next highest rank, that is "2", to the knowledge that is used in the next-to-greatest number of tasks, and so on.

  3. Assign average ranks to ties. To illustrate, the following sample data set has six knowledges. Since Knowledge #2 is used in the most tasks (35), it receives the highest rank, "1". The two knowledges used in the next highest number of tasks receive ranks "2" and "3". Knowledges #3 and #4 would be fourth and fifth in the ranking, but are tied for

the number of tasks in which they are used. Therefore, their orders in the ranking are averaged:

("4" + "5") ÷ 2 = "4.5".

Knowledge#	# of Tasks	Rank
1	13	3
2	35	1
3	8	4.5
4	8	4.5
5	2	6
6	15	2

- You now have completed developing an MOS Knowledge Profile for the first MOS. Repeat the above steps for each MOS until profiles have been created for all MOSs included in the study.

STEP 3.2
PREPARE MOS COMPARISON MATRIX

OVERVIEW

In this substep, the TKCAM Analyst compares the knowledge profiles of two MOSs to determine the degree of similarity between them. Similarity is measured in terms of the knowledges they share versus knowledges they do not share. This comparison is done using a tool called the "MOS Comparison Matrix", which the analyst uses to organize the knowledges of two MOSs at a time into categories that are important for subsequent analysis.

LEAD RESPONSIBILITY

— TKCAM Analyst.

DATA REQUIREMENTS

— MOS Knowledge Profiles for each MOS included in study (Worksheets 3-1).

— Knowledge Master List (Worksheet 2-3).

SUPPLIES

— Worksheet 3-2, MOS Comparison Matrix (1 blank copy for each combination of MOSs that is being analyzed. If many knowledges are involved in the comparison, enlarged copies of Worksheet 3-2 may provide more room for recording all the knowledges involved).

PRODUCT

— MOS Comparison Matrix, one for each combination of MOSs under study (Worksheet 3-2).

Page _____ of _____

TKCAM WORKSHEET 3-2

MOS Comparison Matrix

Associated Worksheets:

3-1 MOS Knowledge Profile

Knowledges Common to Both MOSs

ID#	Knowledge	MOS _____ Rank	MOS _____ Rank
___	_____	___	___
___	_____	___	___
___	_____	___	___
___	_____	___	___
___	_____	___	___
___	_____	___	___
___	_____	___	___
___	_____	___	___
___	_____	___	___
___	_____	___	___
___	_____	___	___
___	_____	___	___
___	_____	___	___
___	_____	___	___
___	_____	___	___

Number of Knowledges: _____

Knowledges Unique to MOS: _____

ID#	Knowledge	Rank
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___

Number of Unique Knowledges: _____

Percentage of MOS's Knowledges: _____ %

Knowledges Unique to MOS: _____

ID#	Knowledge	Rank
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___
___	_____	___

Number of Unique Knowledges: _____

Percentage of MOS's Knowledges: _____ %

Knowledges Not Used By Either MOS

ID#	Knowledge
___	_____
___	_____
___	_____
___	_____
___	_____
___	_____
___	_____
___	_____
___	_____
___	_____
___	_____
___	_____
___	_____
___	_____
___	_____

Number of Knowledges: _____

Preparer's Name:

Rank:

MOS/AOC:

Date Prepared:

ANALYST PROCEDURE

- Choose any two MOSs from the group of MOSs under study.
- Examine their knowledge profiles. Find those knowledges that are common to both MOSs. Transfer the ID Number, Title and Rank of each common knowledge to the upper left-hand box of Worksheet 3-2, marked "Knowledges Common to Both MOSs".

  Count the number of common knowledges and place the total in the blank marked "Number of Knowledges:" at the bottom of the box.

NOTE

You may need more space than is available on the worksheet. A large sheet of paper can be used instead of the worksheet, or the information for each block can be written on separate sheets of paper. Then these can be taped together to form the matrix.

- Find those knowledges that are unique to one of the MOSs. These will be all of the knowledges of a particular MOS that were not written down in the preceding step.

  Write the MOS's identifier in the blank next to "Knowledges Unique to MOS: ___".

  Transfer the ID Number, title, and Rank of each knowledge that is unique to this MOS to the upper right-hand box of Worksheet 3-2, marked "Knowledges Unique to MOS: ___".

  Count the number of unique knowledges and place the total in the blank marked "Number of Unique Knowledges: ___" at the bottom of the box. Divide this number by that MOS's total number of knowledges (taken from the MOS Knowledge Profile). Multiply the result by 100. That is the percentage of the MOS's knowledges that are unique with respect to the other MOS. Write this percentage in the space provided.

NOTE

If the analysis is based on only two MOSs, there will not be any enabling criteria in the lower right-hand box. However, if more than two MOSs are involved, the Master List may include enabling criteria that neither MOS in the comparison matrix use.

- Find those knowledges that are unique to the second MOS. This group will be all the knowledges that you did not identify as common with those of the first MOS. Write the MOS's identifier in the blank next to "Knowledges Unique to MOS: ___" in the lower left-hand box of the worksheet.

  Repeat the previous step for this second MOS (that is, list the unique knowledges, calculate the percentage of unique knowledges).

- In the lower right-hand box, list any knowledges from the Knowledge Master List that neither MOS used. In other words, this section of the worksheet should contain all those knowledges that are in the master list but not in either MOS's knowledge profile.

- Repeat these procedures for all possible pairs of MOSs under study. For example, if six MOSs (A, B, C, D, E and F) were being evaluated for restructuring, 15 MOS-to-MOS comparisons would have to be made:

1. A-B	6. B-C	10. C-D	13. D-E	15. E-F
2. A-C	7. B-D	11. C-E	14. D-F	
3. A-D	8. B-E	12. C-F		
4. A-E	9. B-F			
5. A-F				

  Thus, you would need to complete 15 Worksheets 3-2, one for each of these comparisons. Although all of these may not be viable restructuring candidates, the TKCAM audit trail should show that every alternative was considered.

STEP 3.3
COMPUTE MOS COMMONALITY MEASURES

OVERVIEW

In the previous step, MOSs were compared against each other using the MOS Comparison Matrix. Here, measures of commonality are computed as aids in deciding which combinations of MOSs offer the most commonality in terms of shared knowledges.

Note: This step is useful if the study includes more than two MOSs or more than one restructuring alternative. On the other hand, if there are no alternatives to compare, for example, when the TKCAM study addresses a single concept for restructuring two MOSs into one (as is often the case), there is no additional information to be gained by comparing commonality measures and this step can be skipped. In this situation, proceed on to Step 3.4.

If there are MOS restructuring alternatives to be compared, the procedures in this step lead to a ranking of alternatives based on three different indicators of commonality:

- the percentage of common knowledges,
- the number of unique knowledges, and
- the number of tasks requiring unique knowledges.

LEAD RESPONSIBILITY

- TKCAM Analyst.

DATA REQUIREMENTS

- MOS task lists with knowledges for each MOS in study (Worksheets 2-4).
- MOS Knowledge Profiles for each MOS included in study (Worksheets 3-1).
- MOS Comparison Matrix for each MOS-to-MOS pair under study (Worksheets 3-2).

SUPPLIES — Worksheet 3-3, MOS Commonality Measures.

PRODUCT — MOS commonality measures for each pair of MOSs under study (Worksheet 3-3).

ANALYST PROCEDURE

- Write "1" next to "Iteration" at the top of a new Worksheet 3-3.
- Choose any one of the completed Worksheets 3-2. You will transcribe some of its information to Worksheet 3-3 to summarize the commonality measures for the chosen MOS pair. Each box on the worksheet is used to summarize an MOS-to-MOS comparison.

  Refer to the following instructions to complete the information needed in Worksheet 3-3.

  1. ***MOS***: Record the identifier of both MOSs from Worksheet 3-2 in the spaces labeled "MOS" on Worksheet 3-3.

  2. ***Number of Knowledges***: Record in this space the total number of knowledges used by each MOS, taken from that MOS's knowledge profile (Worksheet 3-1). Verify this total by adding the number of an MOS's common knowledges with the number of its unique knowledges.

  3. ***% Knowledges in Common with Other MOS***: Count the number of knowledges that are common to both MOSs (common knowledges). Divide this number by the total number of the first MOS's knowledges. Round off the result to the nearest tens and record in the space provided (for example, 57.14 would be recorded as 60%). Repeat for the second MOS's total number of knowledges. These calculations show the percentage of an MOS's knowledges that are common to the other MOS.

Page _____ of _____

Iteration _____

TKCAM WORKSHEET 3-3

MOS Commonality Measures

Associated Worksheets:

3-2 MOS Comparison Matrix

MOS	Number of Knowledges	% Knowledges in Common with Other MOS	Number of Unique Knowledges	Sum of Ranks	Average Rank	Total Number of Unique Knowledges	Grand Sum of Ranks	Grand Avg. of Ranks

Preparer's Name:

Rank:

MOS/AOC:

Date Prepared:

Page _____ of _____

Iteration _____

TKCAM WORKSHEET 3-3

MOS Commonality Measures

Associated Worksheets:

3-2 MOS Comparison Matrix

MOS	Number of Knowledges	% Knowledges in Common with Other MOS	Number of Unique Knowledges	Sum of Ranks	Average Rank	Total Number of Unique Knowledges	Grand Sum of Ranks	Grand Avg. of Ranks

Preparer's Name:

Rank:

MOS/AOC:

Date Prepared:

Page _____ of _____

Iteration_____

TKCAM WORKSHEET 3-3

MOS Commonality Measures

Associated Worksheets:

3-2 MOS Comparison Matrix

MOS	Number of Knowledges	% Knowledges in Common with Other MOS	Number of Unique Knowledges	Sum of Ranks	Average Rank	Total Number of Unique Knowledges	Grand Sum of Ranks	Grand Avg. of Ranks

Preparer's Name:

Rank:

MOS/AOC:

Date Prepared:

Page _____ of _____

Iteration _____

TKCAM WORKSHEET 3-3

MOS Commonality Measures

Associated Worksheets:

3-2 MOS Comparison Matrix

MOS	Number of Knowledges	% Knowledges in Common with Other MOS	Number of Unique Knowledges	Sum of Ranks	Average Rank	Total Number of Unique Knowledges	Grand Sum of Ranks	Grand Avg. of Ranks

Preparer's Name:

Rank:

MOS/AOC:

Date Prepared:

Page _____ of _____

Iteration _____

TKCAM WORKSHEET 3-3

MOS Commonality Measures

Associated Worksheets:

3-2 MOS Comparison Matrix

MOS	Number of Knowledges	% Knowledges in Common with Other MOS	Number of Unique Knowledges	Sum of Ranks	Average Rank	Total Number of Unique Knowledges	Grand Sum of Ranks	Grand Avg. of Ranks

Preparer's Name:

Rank:

MOS/AOC:

Date Prepared:

Page _____ of _____

Iteration _____

TKCAM WORKSHEET 3-3

MOS Commonality Measures

Associated Worksheets:

3-2 MOS Comparison Matrix

MOS	Number of Knowledges	% Knowledges in Common with Other MOS	Number of Unique Knowledges	Sum of Ranks	Average Rank	Total Number of Unique Knowledges	Grand Sum of Ranks	Grand Avg. of Ranks

Preparer's Name:

Rank:

MOS/AOC:

Date Prepared:

Page _____ of _____

Iteration_____

TKCAM WORKSHEET 3-3

MOS Commonality Measures

Associated Worksheets:

3-2 MOS Comparison Matrix

MOS	Number of Knowledges	% Knowledges in Common with Other MOS	Number of Unique Knowledges	Sum of Ranks	Average Rank	Total Number of Unique Knowledges	Grand Sum of Ranks	Grand Avg. of Ranks

Preparer's Name:

Rank:

MOS/AOC:

Date Prepared:

Page _____ of _____

Iteration _____

TKCAM WORKSHEET 3-3

MOS Commonality Measures

Associated Worksheets:

3-2 MOS Comparison Matrix

MOS	Number of Knowledges	% Knowledges in Common with Other MOS	Number of Unique Knowledges	Sum of Ranks	Average Rank	Total Number of Unique Knowledges	Grand Sum of Ranks	Grand Avg. of Ranks

Preparer's Name:

Rank:

MOS/AOC:

Date Prepared:

4. ***Number of Unique Knowledges***: Count the number of unique knowledges belonging to each MOS (found in the upper right and lower left quadrants of Worksheet 3-2). Record these figures in the appropriate spaces in this column.

5. ***Sum of Ranks***: Add the ranks for the unique knowledges of each MOS and place that sum in this space on the worksheet.

6. ***Average Rank***: Divide the sums for both MOSs computed in the last column by the number of unique knowledges belonging to their respective MOSs. Round off to the unit's position and record on the worksheet. For example, 8.56 would be recorded as 9.

   A low number, that is, close to 1 which is the rank assigned to the knowledge used by the most tasks, indicates that the unique knowledges are required in many tasks. A high number, on the other hand, indicates that the unique knowledges are used in relatively fewer tasks.

The final three measures are used to compare pairs of MOSs with one another.

7. ***Total # of Unique Knowledges***: Add the number of unique knowledges belonging to the first MOS with the number belonging to the second. Place the result in this column.

8. ***Grand Sum of Ranks***: Add the ranks of the unique knowledges belonging to the first MOS (from the "Sum of Ranks" column) with the ranks of those belonging to the second. Place the result in this column.

9. ***Grand Average of Ranks***: Divide the number you calculated in the last step, the total of the ranks, by the total number of unique knowledges (number 7, above). Round off to the unit's position and record on the worksheet.

- Choose another completed Worksheet 3-2. Repeat the previous set of summary calculations for each MOS-to-MOS comparison. Record the information on the same Worksheet 3-3. Use another worksheet if you must record more than seven pairs of MOSs.

- When there are more than two MOSs in the study and a number of restructuring alternatives under consideration, repeat this step for each alternative. Determine whether the restructured MOSs can be further grouped with either those not restructured or newly restructured groups. This will be the second iteration; write "2" next to "Iteration" at the top of the appropriate worksheets used in Step 3.0.

  Restructurings need not be limited to simple pairings. Two, three, or more MOSs might be restructured under certain circumstances. For example, potentially there are thousands of possible combinations of the hypothetical 15 pairings described in Step 3.2—MOSs A-B-C or A-D-E-F or even A-B-C-D-E-F. Looking at all of these individually is impractical, but many of the likely combinations can be explored progressively.

  Look first at the pairs of MOSs that might be restructured. This is the first iteration. Then look at how any remaining MOSs might in turn be combined with those restructured in the first sweep. Repeat this process again until all MOSs that should be restructured have been grouped or there are no more viable restructuring opportunities.

STEP 3.4
CHOOSE RESTRUCTURING CANDIDATES

OVERVIEW

The TKCAM Analyst chooses the best MOS restructuring candidates in this step. Based on the commonality data summarized in the previous step, the analyst can select one or more MOS pairs for restructuring. Or, several MOSs that are sufficiently similar in knowledge requirements might be selected to be restructured. On the other hand, none of the pairs studied may be good candidates because of the magnitude of the differences between them.

TKCAM uses commonality of knowledge requirements as an indicator of the commonality between MOSs. There is no single formula or measure of commonality that determines some MOSs can be restructured and some cannot. Two MOSs that share 90 percent of their knowledges might be excellent consolidation candidates. Another two that share the same amount might not be good candidates. While their numerical commonality might be the same, the result would depend on the nature of their differences and the potential impact of those differences on the overall force structure. For this reason, deciding whether there is sufficient commonality for restructuring is judgmental. Further, there may well be factors other than commonality of knowledges which may carry important weight in making this judgment.

How is this judgment made? Earlier procedures created knowledge profiles of the MOSs and expressed those data in a number of different ways. Two types of factors --- commonality factors and decision factors --- are relevant to your decision. Commonality factors are the various measures derived from the knowledges data in Step 3.3. Decision factors are larger, MOS life-cycle issues that can be extrapolated from the commonality factors.

Commonality Factors

The three factors and the overall ranks that are indexed in Worksheet 3-3 are discussed below. Your analysis does not have to end with these, however. Nor do your interpretations have to match the guidance presented. Each restructuring decision will be different from the next. Your judgment, tempered by the data on Worksheet 3-3, will be the most important factor in deciding whether to restructure MOSs.

NOTE

Commonality and decision factors imply that the best restructuring candidates among the group of MOSs under study should be recommended for restructuring. This, however, is not necessarily true. TKCAM analysis may reveal that there are no viable restructuring candidates among a particular group of MOSs.

1. ***Percent of knowledges in common with other MOS.*** This indicates the degree to which an MOS (or group) shares knowledge requirements with another. The more knowledges they have in common (the higher the percentage)—relative to their respective total number of knowledges—the easier it may be to restructure them.

2. ***Total number of unique knowledges.*** The analyst must consider the training implications of a restructuring. When, say, two MOSs are consolidated, the unique knowledges of one have to be trained to soldiers in the other MOS, and vice versa. Is this training burden acceptable?

3. ***Grand average of ranks.*** This is a rough index of the importance of the tasks that underlie the knowledge requirements of a proposed MOS grouping. Higher values represent lower ranks. The lower ranks in turn represent unique knowledges that have few tasks associated with them.

Decision Factors

Once a general measure of the compatibility between two or more MOSs is established by comparing their knowledge requirements, the analyst must consider some related, underlying factors that influence an MOS restructuring. Four such factors that can be extrapolated qualitatively from TKCAM data are described below. Still others may apply under different circumstances. The only real rule is that no two comparisons will be alike.

1. *Length of training.* This is a recurrent factor because an MOS that requires excessive training probably will have excessive life-cycle costs, and may not be viable. An MOS's length of training is a direct function of the number and complexity of the knowledges being trained.

   Estimates of a proposed MOS's length of training can be made because, for the most part, knowledges are derived from POI lessons of existing MOSs, which have established training time requirements. The training times of individual knowledges can be added to get a rough indication of the restructured MOS's training length requirement. If this time is significantly longer than the training length for current, related MOSs, the proposed MOS may not be viable.

2. *Transition training.* This is a one-time factor because the cost associated with training unique knowledges of one MOS to the soldiers of other MOSs that are to be consolidated may be too great. Although this essentially is a one-time cost (existing soldiers go through transition training once, new soldiers start from scratch, where all knowledges for the MOS are incorporated into its training), it may be high enough to influence the MOS decision.

   The transition training requirement can be estimated by multiplying the training times of unique knowledges by the number of soldiers who would need training in those knowledges.

3. *Soldier quality requirements.* A new MOS resulting from the consolidation of current MOSs might require different "quality" soldiers. The quality requirements may be lower or higher depending upon the new tasks that need to be performed. Changes in doctrine or technology, for example, can either simplify or complicate the performance of some tasks leading to new soldier requirements in terms of quality. The Armed Services Vocational Aptitude Battery (ASVAB) requirement, as one indicator of soldier quality, may increase or decrease. TKCAM's knowledges data may be used to identify potential changes. The impact of a consolidation on soldier quality requirements, in addition to the results of TKCAM analysis, is one area requiring consideration before final conclusions are made.

By benchmarking ASVAB requirements of the current MOSs, reviewing the relative difficulty of the knowledges for the new MOS, and considering the total picture of what is going on in the new MOS, the analyst can develop estimates of the ASVAB requirement.

4. ***Transition soldier quality requirements.*** Changes in quality requirements as a result of an MOS restructuring may affect soldiers in current MOSs during the transition period. If quality requirements increase over those for soldiers in a current MOS that is being restructured, these soldiers may find themselves unqualified for the new MOS. For example, in an MOS consolidation involving two current MOSs where one requires an ASVAB Aptitude Area score of EL 95 and the other requires a score of EL 105, if the new requirement is also EL 105, soldiers in the MOS with the lower requirement may not all be qualified for the new MOS.

   Transition effects on soldier quality, although less enduring than long-term impacts, nevertheless may be consequential in determining that an MOS consolidation is feasible.

LEAD RESPONSIBILITY

— TKCAM Analyst.

DATA REQUIREMENTS

— MOS Knowledge Profiles for each MOS in study (Worksheets 3-1).

— MOS Comparison Matrix for each MOS-to-MOS pair under study (Worksheets 3-2).

— MOS Commonality Measures (Worksheet 3-3).

PRODUCT

— Analysis of MOS Restructuring Alternatives.

ANALYST PROCEDURE

- Review the commonality factors (Worksheet 3-3) for each MOS pair.
- Review the decision factors for each MOS pair.
- Recommend MOS restructurings (or no restructurings).

STEP 4.0
DOCUMENTATION

PREPARE THE TKCAM SUMMARY REPORT

OVERVIEW

The purpose of this final step is to document the results of the analysis, the recommendations, the data on which they were based, and the rationale for those recommendations. An annotated outline of the TKCAM Summary Report is presented here. This identifies the minimum data required to document the TKCAM results. The TKCAM Analyst may add any additional information that would support the MOS recommendation documented in the report.

LEAD RESPONSIBILITY

TKCAM Analyst.

DATA REQUIREMENTS

— All completed TKCAM worksheets.

PRODUCT

— TKCAM Summary Report.

ANALYST PROCEDURES

- The TKCAM Summary Report documents the TKCAM study and results for consideration and action by those in the personnel proponent office, training center, or elsewhere having responsibility to act on the study's recommendation. The report should contain at least the following three sections:

  — **Recommendation:** State the MOS recommendations. These should correspond to any specific goals or inquiries that led to the TKCAM study.

  — **Data:** Summarize the data that support the recommendations. Data from Worksheet 3-2 and Worksheet 3-3 are useful.

Remaining TKCAM data contained in the worksheets should be maintained as an audit trail, a resource for detailed questions about the analysis. These data should be collected and organized under separate cover as a companion document to the summary report.

— **Rationale**: Document the reasons or rationale for the MOS recommendation; this should center around the data as it pertains to the three commonality factors and four decision factors described in Step 3.4.

NOTE

In its most minimal form, the results can be documented in a one page memorandum, to which is attached the MOS Comparison Matrices (Worksheets 3-2). More extensive documentation may be prepared depending upon the requirements of the intended audience.

- Additional information may be included depending upon the audience's needs. Following are three additional sections that may be included:

  — **Background**: State the issues or circumstances leading up to the TKCAM study in a few short, numbered points. Identify the MOSs that were included in the analysis. Include whether a change in policy, doctrine, equipment, budget, or some other factor precipitated the current analysis.

  State any specific goals. Some examples are reducing the number of MOSs by a certain percentage, eliminating MOSs, and integrating new equipment into the force structure.

  — **Methodology**: Summarize the TKCAM for the decisionmakers who will make decisions based on the TKCAM analysis results. This should familiarize them with how the results were obtained.

  — **Data Resources**: List the documents, databases, and other sources of data used during the analysis. Also, summarize the experience of the SMEs.

APPENDIX A
LIST OF ACRONYMS

LIST OF ACRONYMS

ASI	Additional Skill Identifier
ASVAB	Armed Services Vocational Aptitude Battery
CMF	Career Management Field
CTL	Critical Task List
MPT	Manpower, Personnel and Training
MOCS	Military Occupational Classification and Structure
MOS	Military Occupational Specialty
NCO	Noncommissioned Officer
PERSCOM	U.S. Total Army Personnel Command
POI	Program of Instruction
SM	Soldier's Manual
SME	Subject Matter Expert
TKCAM	Task Knowledges Commonality Analysis Method
TM	Technical Manual

APPENDIX B

SME INFORMATION FORM

TKCAM Subject Matter Expert Information Form

Information on your US Army background and experience is needed. Please answer those questions that are relevant to you.

Name: _____ SME Panel #: _____

When did you enter the US Army: ____/____
Month/Year

Please provide the following information about your current MOS:

MOS: _____ Grade: _____ Acquired MOS: ____/____

Additional Skill Identifiers: 1. _____ 3. _____
2. _____ 4. _____

List field assignments in your current MOS:

	TYPE	DURATION From (M/Y)	to
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____

Fill in the following information about any other MOSs you have held:

		From (M/Y)	to
1.	_____	_____	_____
2.	_____	_____	_____

List any relevant training courses completed in your specialty:

	NUMBER/TITLE	LENGTH (weeks)
1.	_____	_____
2.	_____	_____

APPENDIX C

KNOWLEDGE GUIDELINES

KNOWLEDGES IN TKCAM

OVERVIEW

There are many ways to describe similarities and differences between Army jobs, or MOSs, and the qualities of the soldiers needed to perform them. Knowledge requirements, number of personnel, location on the battlefield, physical requirements of soldiers, all describe some aspects of MOSs that can be compared against those of other MOSs. Among these, the most indicative of fundamental differences is knowledge.

Knowledge can be thought of as a primary indicator of a job and its requirements; other measures like length of training or Armed Services Vocational Aptitude Battery test score requirements do not necessarily discriminate between the similarities and differences among jobs and their requirements. Knowledge requirements, however, do point up similarities and differences. Therefore, TKCAM focuses and relies on knowledge to analyze commonality among jobs.

This appendix provides guidelines for developing knowledges in a TKCAM application. Its purpose is to help SMEs identify knowledges in a TKCAM application and achieve uniformity of format, style, and level of detail. Appendix D lists examples of knowledges used in earlier TKCAM studies.

The guidelines address four areas: how to identify and describe knowledges (Step 2.1), how to document knowledges (Step 2.1 and Step 2.2), how to verify knowledges (Step 2.2), and how to match knowledges to tasks (Step 2.5).

IDENTIFY MOS KNOWLEDGES (STEP 2.1)

Knowledge requirements of MOSs typically do not exist in the form needed by TKCAM. They must be pulled from several sources and converted into TKCAM knowledges. This section describes how that can be done. First, it presents three general categories of knowledge. Second, it discusses potential sources of knowledge requirements and how to extract what is relevant to TKCAM. Last, it provides examples of knowledges being derived from POIs.

Categories of Knowledges

An approach to identifying knowledges in TKCAM considers three different categories of knowledges: theory, object, and method. TKCAM does not explicitly deal with these; there is no procedure or analysis that depends on knowledge category because there is no standard relationship between categories. For instance, theory category knowledges may be extremely important to one restructuring analysis and not important at all to another. However, the distinction between theory and, say, method may be important information in an MOS-to-MOS comparison in which the relative importance of one category over another can be determined or estimated. Knowledges in the theory category, for instance, might have a larger impact on a particular proposed MOS merger than those in the method category because they might require significantly more training time.

1. ***Theory***: This category describes a single theoretical concept, scientific principle, doctrine, set of rules or body of knowledge. Examples of these knowledges are Mathematics, Electricity, Physics, Cryptography, and Geography.

2. ***Object***: Knowledges in the object category describe physical items or classes of items with some degree of specificity. In order to perform a task, soldiers must have some familiarity and understanding of the type of equipment the knowledges describe. Technical Manuals, Track Vehicle Suspension Systems, Parallel Electrical Circuits, Rockets and Alternating Current Generators are examples of these types of knowledges.

3. ***Method***: This category contains knowledges describing methods, procedures, or techniques that exist independent of any one item of equipment. In order to perform a task requiring a method category of knowledge, a soldier must have some familiarity or experience with the method. Electrical Troubleshooting, Map Reading, Motor Vehicle Operation, Arc Welding are examples of method knowledges.

Sources of Knowledges

Three sources of knowledges in order of their usefulness are POIs, AR 611-201, and SMEs. Together these should account for most of the knowledges identified in a TKCAM study. Additional sources such as soldier's manuals, technical manuals, and field manuals related to the MOSs under study can supplement the POIs. Use as many sources as are available. Not only does this increase the coverage of the MOSs, using multiple sources is the best way to refine the knowledges for accuracy and completeness. For example, you might first derive knowledges from each MOS's POIs, then check them against the MOS's description in AR 611-201 to ensure they include all of the MOS's duties and tasks.

1. ***Theory***: These types of knowledges are typically found in the initial training annex or annexes in the POIs because they are the foundation for the rest of the MOS training, as well as the tasks that the MOS holder must perform. List all elements in the scope description for each knowledge.

2. ***Object***: Object knowledges are usually found in POIs, soldier's manuals and technical manuals. Look for POI file titles or technical manual tasks that involve a specific object or family of objects (e.g., Gunner's Quadrant, Recoil System), but try to identify objects by their technology rather than the equipment system to which they belong. Remember that the knowledges will be used to answer two questions: are these tasks different and how are they different? The answer to the second question cannot simply be based on the equipment system title. If knowledge of one task can be generalized to another, the two are the same for the purpose of TKCAM.

3. ***Method***: Method category knowledges typically include knowledges like diagnostics, planning, report preparation, troubleshooting and repair techniques. They are found principally in POIs and technical manuals, although they can be derived from AR 611-201 duties and task descriptions.

Deriving Knowledges: Examples

On the next six pages are examples of the process by which knowledges can be extracted from an Army POI. These examples are based on a POI for MOS 62B which, at the time of its publication, was a Construction Equipment Repairer.

COURSE: 612-62B10 Construction Equipment Repairer
TRAINING ANNEX A: Shop Operations

PURPOSE: To provide the student an overview of the Army maintenance structure. To teach the student to use the technical references and complete the maintenance forms and records that support the systems. To teach the student to identify and use general mechanic and special tools. To teach the student to perform arc and oxyacetylene field expedient welds.

TOTAL HOURS: PEACETIME - 36.0 MOBILIZATION - 36.0

POI FILE NO/TITLE	ACADEMIC HOURS PEACETIME HOURS/TYPE	ACADEMIC HOURS MOBILIZATION HOURS/TYPE	OBJECTIVE/SCOPE
62B10-A1 The Army Maintenance Structure	1.0 1.0 C	1.0 1.0 C	Introduces the student to the four levels of maintenance found in the Army maintenance structure and the activities performed at each level. Teaches the student to determine responsibility for performance of maintenance functions. Provides definitions of terms used in the maintenance field. Instructor/Student ratio: C, 1:Class.
62B10-A2 Technical Publications	5.0 2.0 C 3.0 PE3	5.0 2.0 C 3.0 PE3	Provides the student with the basic skills and knowledge needed to locate and utilize technical information contained in maintenance and repair parts manuals, both commercial and military. Maintenance manual instruction will include: utilization of the Preventive Maintenance Checks and Services (PMCS) section, Maintenance Allocation Chart (MAC), troubleshooting section, and maintenance instructions. The student will be taught to order repair parts using National Stock Numbers (NSN) and Manufactures Parts Numbers. Instructor/Student ratio: C, 1:Class PE3, 1:10.
62B10-A3 Maintenance Forms/Records	6.0 2.0 C 3.0 PE3	6.0 2.0 C 3.0 PE3	To teach the student the preparation and usage of DA Form 2404 (Equipment Inspection and Maintenance Worksheet). Introduce the student to DA form 2407 (Maintenance Request), DA Form 2402 (Exchange Tag), DA Form 5504 (Maintenance Request), DA Form 2408-14 (Uncorrected Faults Record), the equipment log book and its related forms. Using technical and repair parts manuals, the student will participate in a practical exercise requiring the completion of DA Form 2404. Instructor/Student ratio: C, 1:Class PE3, 1:10.

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TKCAM WORKSHEET 2-1

MOS Knowledge

Associated Worksheet(s):
2-2 Verify/Modify Knowledge
2-3 Knowledge Master List

ID Number: _____ (To be completed by TKCAM Analyst)

Source MOS: 62B

Skill Level: 1 (1, 2, 3, or 4)

Source Document(s): POI 62B10-A1 Page: 5

Title: Army Maintenance Structure

Suggestions for writing "Title":

1. Identify knowledge required — what does the soldier need to know.
2. Do not describe what the soldier does — that is, DO NOT WRITE TASK STATEMENTS.

Description:

(Select one if applicable) ☐ Knowledge of: ☒ Understanding of: ☐ Principles of:

Four levels of maintenance in the Army maintenance structure and the activities at each level; definition and terms used in the maintenance field.

Example: Fundamentals of Electricity

An understanding of voltage, current, resistance, and use of Ohm's Law; use of electrical circuit components; electrical schematics and electrical symbols.

Preparer's Name: A Swithee
Rank: SFC
MOS/AOC: 62B

Date Prepared: 11/15/97

Figure C-1. Develop Knowledges: Army Maintenance Structure.

COURSE: 612-62B10 Construction Equipment Repairer
TRAINING ANNEX A: Shop Operations

PURPOSE: To provide the student an overview of the Army maintenance structure. To teach the student to use the technical references and complete the maintenance forms and records that support the systems. To teach the student to identify and use general mechanic and special tools. To teach the student to perform arc and oxyacetylene field expedient welds.

TOTAL HOURS: PEACETIME - 36.0 MOBILIZATION - 36.0

POI FILE NO/TITLE	ACADEMIC HOURS PEACETIME HOURS/TYPE	ACADEMIC HOURS MOBILIZATION HOURS/TYPE	OBJECTIVE/SCOPE
62B10-A1 The Army Maintenance Structure	1.0 1.0 C	1.0 1.0 C	Introduces the student to the four levels of maintenance found in the Army maintenance structure and the activities performed at each level. Teaches the student to determine responsibility for performance of maintenance functions. Provides definitions of terms used in the maintenance field. Instructor/Student ratio: C, 1:Class.
62B10-A2 Technical Publications	5.0 2.0 C 3.0 PE3	5.0 2.0 C 3.0 PE3	Provides the student with the basic skills and knowledge needed to locate and utilize technical information contained in maintenance and repair parts manuals, both commercial and military. Maintenance manual instruction will include: utilization of the Preventive Maintenance Checks and Services (PMCS) section, Maintenance Allocation Chart (MAC), troubleshooting section, and maintenance instructions. The student will be taught to order repair parts using National Stock Numbers (NSN) and Manufactures Parts Numbers. Instructor/Student ratio: C, 1:Class PE3, 1:10.
62B10-A3 Maintenance Forms/Records	5.0 2.0 C 3.0 PE3	5.0 2.0 C 3.0 PE3	To teach the student the preparation and usage of DA Form 2404 (Equipment Inspection and Maintenance Worksheet). Introduce the student to DA form 2407 (Maintenance Request), DA Form 2402 (Exchange Tag), DA Form 5504 (Maintenance Request), DA Form 2408-14 (Uncorrected Faults Record), the equipment log book and its related forms. Using technical and repair parts manuals, the student will participate in a practical exercise requiring the completion of DA Form 2404. Instructor/Student ratio: C, 1:Class PE3, 1:10.

Page ____ of ____

TKCAM WORKSHEET 2-1

MOS Knowledge

Associated Worksheet(s):
2-2 Verify/Modify Knowledge
2-3 Knowledge Master List

ID Number: _____ (To be completed by TKCAM Analyst)

Source MOS: 62B

Skill Level: 1 (1, 2, 3, or 4)

Source Document(s): POI 62B10-A1 Page: 8

Title: Technical Publications

Suggestions for writing "Title":

1. Identify knowledge required — what does the soldier need to know.
2. Do not describe what the soldier does — that is, DO NOT WRITE TASK STATEMENTS.

Description:

(Select one if applicable) ☐ Knowledge of: ☐ Understanding of: ☐ Principles of:

Knowledge needed to locate and use technical information contained in maintenance and repair parts manuals including PMCS section, MAC, troubleshooting section, and maintenance instructions.

Example: Fundamentals of Electricity
An understanding of voltage, current, resistance, and use of Ohm's Law; use of electrical circuit components; electrical schematics and electrical symbols.

Preparer's Name: A Smithee
Rank: SFC
MOS/AOC: 62B

Date Prepared: 11/15/97

Figure C-2. Develop Knowledges: Technical Publications.

COURSE: 612-62B10 Construction Equipment Repairer
TRAINING ANNEX B: Fundamentals of Automotive Electricity

PURPOSE: To teach the fundamentals of automotive electricity, wiring diagrams, and lead acid battery construction. To teach the components and operating principles of starting, charging and accessory electrical circuits. Emphasizes troubleshooting electrical systems malfunctions using the multimeter and STE/ICE.

TOTAL HOURS: PEACETIME - 36.0 MOBILIZATION - 36.0

POI FILE NO/TITLE	ACADEMIC HOURS PEACETIME HOURS/TYPE	ACADEMIC HOURS MOBILIZATION HOURS/TYPE	OBJECTIVE/SCOPE
62B10-A1 Fundamentals of Electricity	2.0 2.0 C	2.0 2.0 C	Teaches the student to define voltage, current, and resistance and how to find their values using Ohm's Law. Teaches the student to identify and define the use of electrical circuit components. Teaches the student electrical terminology. Instructor/Student ratio: C, 1:Class.
62B10-B2 Wiring Diagrams	2.5 1.0 C 1.5 PE3	2.5 1.0 C 1.5 PE3	Teaches the student to read and interpret electrical schematic and associate electrical symbols with actual components. Instructor/Student ratio: C, 1:Class PE3, 1:10
62B10-B3 Lead Acid Batteries	1.5 0.5 C 1.0 PE1	1.5 0.5 C 1.0 PE1	Teaches the student battery construction and maintenance. Teaches how to disconnect batteries and how to connect batteri in proper configuration. Teaches the determination of electrical charge using a DUO-CHEK. Teaches safety practices be observed when working with batteries. Instructor/Student ratio: C, 1:Class PE1, 1:10.
62B10-B4 Starting/Accessory Circuits	1.0 1.0 C	1.0 1.0 C	Teaches the student the construction and operation of startin system components and accessory circuits. Provides instructic on faults occurring most often in starting and accessory circuits. Instructor/Student ratio: C, 1:Class.
62B10-B5 Charging Systems	1.0 1.0 C	1.0 1.0 C	Teaches the student the construction and operation of charging system components. Instructor/Student ratio: C, 1:Class.
62B10-B6 Multimeter Operation	3.0 1.0 C 2.0 PE1	3.0 1.0 C 2.0 PE1	Teaches the student how to set-up a multimeter for operation a how to perform an operational check, low-voltage circuit test, resistance test, continuity test, and diode test. Teaches safety and maintenance of the multimeter. Instructor/Student ratio: C, 1:Class PE3, 1:10.

Page ____ of ____

TKCAM WORKSHEET 2-1

MOS Knowledge

Associated Worksheet(s):
2-2 Verify/Modify Knowledge
2-3 Knowledge Master List

ID Number: _____ (To be completed by TKCAM Analyst)

Source MOS: 62B

Skill Level: 1 (1, 2, 3, or 4)

Source Document(s): POI 62B10-A1 Page: 10

Title: Electricity, Fundamentals

Suggestions for writing "Title":

1. Identify knowledge required — what does the soldier need to know.
2. Do not describe what the soldier does — that is, DO NOT WRITE TASK STATEMENTS.

Description:

(Select one if applicable) ☐ Knowledge of: ☒ Understanding of: ☐ Principles of:

Voltage, current, resistance, and use of Ohm's Law; use of electrical circuit components; electrical schematics and electrical repairs symbols.

Example: Fundamentals of Electricity

An understanding of voltage, current, resistance, and use of Ohm's Law; use of electrical circuit components; electrical schematics and electrical symbols.

Preparer's Name: A Smithee
Rank: SFC
MOS/AOC: 62B

Date Prepared: 11/15/97

Figure C-3. Develop Knowledges: Electricity, Fundamentals.

COURSE: 612-62B10 Construction Equipment Repairer
TRAINING ANNEX C: Fundamentals of Engines/Disassembly and Reassembly of the (Caterpillar) Engine

PURPOSE: To teach the fundamentals of internal combustion engine construction and operation to include air induction, cooling, lubrication, and fuel systems. Students will disassemble and reassemble a diesel (Caterpillar) engine. Engine unique safety observations and shop safety will be stressed prior to and during each practical exercise lesson.

TOTAL HOURS: PEACETIME - 36.0 MOBILIZATION - 38.0

POI FILE NO/TITLE	ACADEMIC HOURS PEACETIME HOURS/TYPE	ACADEMIC HOURS MOBILIZATION HOURS/TYPE	OBJECTIVE/SCOPE
62B10-C1 Engine Fundamentals	3.0 2.0 C 1.0 F	3.0 2.0 C 1.0 F	Teaches the student basic engine construction to include all rotating and reciprocating parts. Teaches fundamentals of fuel, ignition, cooling, and lubrication systems. Compares two stroke and four stroke engines and gasoline versus diesel engines. Teaches classification of engines by valve and cylinder arrangement and valve timing in relation to piston stroke. Instructor/Student ratio: C, 1:Class F, 1:Class.
62B10-C2 Engine Disassembly	10.0 1.0 C 9.0 PE1	12.0 1.5 C 10.5 PE1	Teaches the student correct procedures to remove a water pump, turbocharger, high pressure fuel injection pump, starter, alternator, and engine head. Teaches correct use of all special tools required in performing each task. Instructor/Student ratio: C, 1:Class PE1, 1:4.
62B10-C3 Air Induction Systems	1.0 1.0 C	1.0 1.0 C	Teaches the student to diagnose malfunctions associated with the air induction system. Teaches inspection of the air induction system and replacement of the turbocharger. Instructor/Student ratio: C, 1:Class.
62B10-C4 Cooling Systems	1.0 1.0 C	1.0 1.0 C	Teaches the student to diagnose malfunctions associated with engine cooling systems. Teaches inspection of the cooling system and replacement of a water pump. Instructor/Student ratio: C, 1:Class.
62B10-C5 Lubrication Systems	1.0 1.0 C	1.0 1.0 C	Teaches the student to diagnose malfunctions associated with the engine lubrication system. Teaches inspection and maintenance of lubrication system components. Instructor/Student ratio: C, 1: Class.

Page ___ of ___

TKCAM WORKSHEET 2-1

MOS Knowledge

Associated Worksheet(s):
2-2 Verify/Modify Knowledge
2-3 Knowledge Master List

ID Number: _____ (To be completed by TKCAM Analyst)

Source MOS: 62B

Skill Level: 1 (1, 2, 3, or 4)

Source Document(s): POI 62B10-A1 Page: 14

Title: Engine Fundamentals

Suggestions for writing "Title":

1. Identify knowledge required — what does the soldier need to know.
2. Do not describe what the soldier does — that is, DO NOT WRITE TASK STATEMENTS.

Description:

(Select one if applicable) [X] Knowledge of: [ ] Understanding of: [ ] Principles of:

Basic engine construction including rotating and reciprocating parts, fuel ignition, cooling, and lubricating systems; two stroke versus four stroke engines; gasoline versus diesel engines.

Example: Fundamentals of Electricity

An understanding of voltage, current, resistance, and use of Ohm's Law; use of electrical circuit components; electrical schematics and electrical symbols.

Preparer's Name: A Smithee
Rank: SFC
MOS/AOC: 62B

Date Prepared: 11/15/97

Figure C-4. Develop Knowledges: Engine Fundamentals.

COURSE: 612-62B10 Construction Equipment Repairer
TRAINING ANNEX C: Fundamentals of Engines/Disassembly and Reassembly of the (Caterpillar) Engine

PURPOSE: To teach the fundamentals of internal combustion engine construction and operation to include air induction, cooling, lubrication, and fuel systems. Students will disassemble and reassemble a diesel (Caterpillar) engine. Engine unique safety observations and shop safety will be stressed prior to and during each practical exercise lesson.

TOTAL HOURS: PEACETIME - 36.0 MOBILIZATION - 38.0

POI FILE NO/TITLE	ACADEMIC HOURS PEACETIME HOURS/TYPE	ACADEMIC HOURS MOBILIZATION HOURS/TYPE	OBJECTIVE/SCOPE
62B10-C1 Engine Fundamentals	3.0 2.0 C 1.0 F	3.0 2.0 C 1.0 F	Teaches the student basic engine construction to include all rotating and reciprocating parts. Teaches fundamentals of fue ignition, cooling, and lubrication systems. Compares two stro and four stroke engines and gasoline versus diesel engines. Teaches classification of engines by valve and cylinder arrangement and valve timing in relation to piston stroke. Instructor/Student ratio: C, 1:Class F, 1:Class.
62B10-C2 Engine Disassembly	19.0 1.0 C 9.0 PEI	12.0 1.5 C 10.5 PEI	Teaches the student correct procedures to remove a water pump turbocharger, high pressure fuel injection pump, starter, alternator, and engine head. Teaches correct use of all specia tools required in performing each task. Instructor/Student ratio: C, 1:Class PEI, 1:4.
62B10-C Air	1.0 1.0	1.0 1.0 C	Teaches the student to diagnose malfunctions associated with a duction system eaches inspectio the air indu nd replacer the turbocha Instructo 1:Class
NO/TITLE -C6 .1 Systems (Cat scroll)	PE .5 C		engine Tea injecti ustment igh i or speed and inspe d maintenan l system onents. Instructor/ ent ratio: C, ds
62B10-C7 Engine Reassembly	18.5 18.5 PEI	18.5 18.5 PEI	Teaches the student the reassembly procedures for a Caterpilla diesel engine, which was disassembled during C2 and further trained in C3 thru C6. All engine components removed during C will be reinstalled. Students will be taught all final adjustments and diagnostic and troubleshooting procedures necessary to produce an operational engine. Instructor/Student ratio: PEI, 1:4.

Page ____ of ____

TKCAM WORKSHEET 2-1

MOS Knowledge

Associated Worksheet(s):
2-2 Verify/Modify Knowledge
2-3 Knowledge Master List

ID Number: _____ (To be completed by TKCAM Analyst)

Source MOS: 62B

Skill Level: 1 (1, 2, 3, or 4)

Source Document(s): POI 62B10-C2,C7 Page: 19,23

Title: Engine Assembly

Suggestions for writing "Title":

1. Identify knowledge required — what does the soldier need to know.
2. Do not describe what the soldier does — that is, DO NOT WRITE TASK STATEMENTS.

Description:

(Select one if applicable) [X] Knowledge of: [ ] Understanding of: [ ] Principles of:

Procedures to assemble and disassemble diesel engine.

Example: Fundamentals of Electricity

An understanding of voltage, current, resistance, and use of Ohm's Law; use of electrical circuit components; electrical schematics and electrical symbols.

Preparer's Name: A Swithee
Rank: SFC
MOS/AOC: 62B

Date Prepared: 11/15/97

Figure C-5. Develop Knowledges: Engine Assembly.

COURSE: 612-62B10 Construction Equipment Repairer
TRAINING ANNEX I: Operators Preventive Maintenance Checks and Services (PMCS)/Scheduled Services

PURPOSE: To provide the student an overview of PMCS's and their importance to the maintenance program. Teaches the student how to locate, test, check, adjust, service, and how to start, move, and manipulate controls on selected items of construction and special purpose equipment. Safety prior to and during each PEI will be stressed.

TOTAL HOURS: PEACETIME - 28.0 MOBILIZATION - 28.0

POI FILE NO/TITLE	ACADEMIC HOURS PEACETIME HOURS/TYPE	ACADEMIC HOURS MOBILIZATION HOURS/TYPE	OBJECTIVE/SCOPE
62B10-I1 Introduction to PMCS	3.0 3.0 C	3.0 3.0 C	This lesson will provide the student with an overview of the types of PMCS's that are performed and reinforce the use of DA Form 2404. It will also outline the Army Oil Analysis Program (AOAP), teaching the types of test performed, individual responsibility, sampling techniques, and the records and forms used. Teaches the use of ground guides and appropriate hand arm signals for safe operation of equipment.
62B10-I2 Operator's PMCS and Scheduled Preventive Maintenance Checks and Services	25.0 25.0 PEI	25.0 25.0 PEI	This training will consist of 5 training stations conducted in round robin format. The training stations will be: Station 1: Operators PMCS Station 2: Scheduled Service on the Earthmoving Scrapers Station 3: Scheduled Service on the Scooploader Station 4: Scheduled Service on the Road Grader Station 5: Scheduled Service on the Crawler Tractor FT Station one teaches the student to perform operator PMCS on selected items of construction equipment. This will include performing before, during, and after operational checks, starting, moving, manipulation of controls, and proper shutdown procedures. The training station will consist of: 2 ea Earth Moving Scrapers 2 ea Scooploaders 2 ea Road Graders 2 ea Crawler Tractors Full Tracked The Student/Equipment/Instructor ratio will be 2:1

Page ___ of ___

TKCAM WORKSHEET 2-1

MOS Knowledge

Associated Worksheet(s):
2-2 Verify/Modify Knowledge
2-3 Knowledge Master List

ID Number: _____ (To be completed by TKCAM Analyst)

Source MOS: 62B

Skill Level: 1 (1, 2, 3, or 4)

Source Document(s): POI 62B10 - Annex I Page: 12

Title: PMCS Procedures

Suggestions for writing "Title":

1. Identify knowledge required — what does the soldier need to know.
2. Do not describe what the soldier does — that is, DO NOT WRITE TASK STATEMENTS.

Description:

(Select one if applicable) [X] Knowledge of: [ ] Understanding of: [ ] Principles of:

Performing preventive maintenance checks and services on construction and special purpose equipment including earthmoving scrapers, scooploader, road grader, and crawler tractor full tracked.

Example: Fundamentals of Electricity

An understanding of voltage, current, resistance, and use of Ohm's Law; use of electrical circuit components; electrical schematics and electrical symbols.

Preparer's Name: A Smithee
Rank: SFC
MOS/AOC: 62B

Date Prepared: 11/15/97

Figure C-6. Develop Knowledges: PMCS Procedures.

DOCUMENTATION GUIDELINES (STEP 2.1 AND STEP 2.2)

Knowledges have two key components: title and description and source. Guidelines for the content and structure of knowledges are described below. Use these and the examples when you write or verify knowledges.

Titles

Titles should be brief descriptive statements that characterize the knowledge requirement they represent. DO NOT USE TASK TITLES OR STATEMENTS. Since SMEs will have to search a list for knowledges, titles should begin with the most important element of the knowledge requirement. For instance, a knowledge might read Circuits, Basic rather than Basic Circuits. Pattern your titles after the examples below.

Category	Example Titles
Theory	Electrical Theory Circuits, Basic
Object	Batteries Fire Control Systems
Method	Pneumatics, Troubleshooting of Rigging.

Descriptions

Descriptions elaborate on the knowledge expressed in the title, list related concepts, components, or methods, and define the range and depth of knowledge. The style and wording should be patterned after the POIs from which the knowledges were derived. Write descriptions using the following examples as guidelines:

Category	Example Description
Theory	Understanding of the electron theory of current flow, conductivity, negative electron methods of producing voltage, and components of electricity and their symbols. Includes understanding of the relationships between current, voltage, and resistance (Ohm's Law).

Object	Knowledge of basic map reading. Included are identification of map terrain features, symbols, and colors, use of marginal information, and determination of coordinates, elevation, and distance.
Method	Knowledge of rigging techniques such as knot tying, construction of rope bridges, and preparing simple tackle systems.

VERIFY MOS KNOWLEDGES (STEP 2.2)

Knowledges developed by analysts should be verified by SMEs. Verification should focus on the characteristics listed in the TKCAM procedures: consistency and level of detail, exclusivity, accuracy.

One common problem to avoid is system specificity. Knowledges that describe specific equipment systems—brand name knowledges—are often too narrowly defined to be of use in TKCAM. System specific knowledges may be needed in cases where the general knowledge needed to perform all or part of a task is reflected only in a particular system. For example, if the Army used one and only one type of radio, then knowledge of how to operate that radio would define part of any radio communications task. But there are many types of radios, and much in common, at least in terms of function, between them.

System specific knowledges should be avoided if the criteria, when described more generally, could apply to other tasks on other systems. For example, a generic Cross-Drive Transmission knowledge is more appropriate to TKCAM than M1 Cross-Drive Transmission, M2/3 Cross-Drive Transmission, and others specific to the many other vehicle systems having cross-drive transmission technology. This is not to say that there are no differences between these systems, or that soldiers would not need to learn those differences. The point is that such differences are not critical within the scope of TKCAM. However, if a system-driven knowledge requirement cannot or should not be generalized—such as when that system represents a radical departure from the technology of other systems having similar functions—then a system specific knowledge is appropriate.

Another common problem is redundant knowledges. These usually are found only after the draft Master List has been

completed because knowledges are derived from many sources. The best way to deal with knowledges that repeat or overlap others is to examine all similar and related knowledges together. Choose the best or rewrite them so that each is as independent as possible.

Concerning accuracy of knowledges, the primary role of SMEs should be to reconcile the knowledges derived mainly from training documentation with the knowledge requirements of soldiers in the field. Along those lines, SMEs can add knowledges to the Master List to better reflect the soldier's overall knowledge requirements.

MATCH KNOWLEDGES TO TASKS (STEP 2.5)

In TKCAM, SMEs illustrate the knowledge requirements of tasks by listing those knowledges that best describe them. The knowledges are the basis for determining the similarities and differences between MOS's task demands.

Matching knowledges to tasks is straightforward. Study a task in isolation of all related tasks. Choose from the Knowledge Master List those knowledges that describe the knowledge requirements of a particular task. Remember to think about the knowledge requirements of each of its steps of performance, or subtasks. There is no limit to the number of knowledges you choose, but choose only those that describe in the greatest detail the knowledge needed.

The following example uses a simple maintenance task to illustrate how to assign knowledges. The task is to replace the alternator on a gasoline engine General Motors pickup truck. First, consider the goal of the task: "Replace the alternator". The term "replace" in this context means to remove an existing alternator *and* put an identical unit in its place. While it is reasonable to assume that some kind of testing might have preceded the Replace task, that testing is not under consideration here. Moreover, precise adjustment of the new alternator's position to properly tension the fan belt—the next logical step—may be covered under another task, such as "Adjust the alternator . . . ." Do not assume that the Replace task includes that adjustment.

Second, think about the general steps of performance of the Replace task. To swap a new alternator for an old one these might be: disconnect electrical cable, remove retaining bolts,

remove fan belt, remove alternator. Installing the new alternator involves the same steps in the reverse order. Since you will choose the knowledges necessary to swap a new alternator with the bad one, you do not have to worry about the knowledges for testing the alternator.

Finally, select those knowledges that best describe the knowledge required to perform that task (including its component steps of performance). Ask yourself whether a particular knowledge in the master list is important to performing the task. If you think the answer is yes, choose the knowledge. Initially you may have to look at each knowledge in the context of a particular task. Once you are familiar with the list you will be able to single out those knowledges that might pertain to the task and ignore the rest.

What knowledges should be assigned to the example task? Assume your pass through the master list identified six knowledges that might be needed to replace the alternator:

Electrical Theory (theory)

Electrical Troubleshooting (method)

Technical Manuals (object)

Use of Hand Tools (object)

Vehicle Charging Systems (object)

Vehicle Electrical Systems (object)

The first knowledge is not applicable because the only relevant step in the task is to disconnect the electrical cable, which involves pulling the cable connector apart. Electrical Troubleshooting is not necessary because the task is to *replace*, not test or inspect, the alternator. The other four knowledges probably are relevant. An understanding of technical manuals might be necessary for someone who had little experience with the task or as a general reference. Selection of the proper tools and how to use them is important to the success of the task, so Use of Hand Tools is relevant, as well. Finally, the knowledges associated with the vehicle electrical system, as a whole, and specifically the charging system, of which the alternator is a part, are important for safety and for identification of the right

components under the hood. While it might be argued that a maintainer does not need these knowledges—only technical manuals—they should be included in the list of knowledge needed to perform the task. The question should be "What *should* the maintainer know?", not "What does a typical maintainer know?"

APPENDIX D

SAMPLE KNOWLEDGES

SAMPLE KNOWLEDGES

OVERVIEW

This appendix contains sample knowledges which may be used as a reference in developing knowledges (Step 2.1) and verifying knowledges (Step 2.2). These have been extracted from various Knowledge Master Lists that were developed in the course of previous TKCAM applications and are listed here in no particular order.

The sample knowledges listed here may be used simply for reference as examples or some may be copied and used in a TKCAM application. If used in a TKCAM application, the "source" which is identified on Worksheet 2-1 or Worksheet 2-2 should still be an Army document or the SME's expertise, not this list. The list does not constitute a source with respect to a specific application.

The knowledges listed here are examples that were appropriate for a specific application. Either the title or description may be appropriate for a new application; however, the description may have to be re-worded to be more accurate for its present use.

Whether any of these examples are useful in your TKCAM application, please note that most often knowledges that are unique to each application always must be developed in addition to the samples shown here.

SAMPLE KNOWLEDGES

No.	Knowledges	Description
01	Mechanical Devices and Machines	An understanding of the function and applied principles of mechanical devices such as wheels, pulleys, gears, levers, etc.
02	Shop Math	An understanding of basic mathematics and common measuring tools used in normal maintenance operations.
03	Fuels, Oils, and Lubricants	An understanding of the safe use, types, handling, and storage of fuels, oils, and lubricants. Also, an understanding of the implications of contamination.
04	Use of Specialized tools and TMDE	An understanding of the application and care of specialized tools along with testing, precision measuring devices, and diagnostic equipment.
05	Reciprocating Engines	An understanding of the operating principles of engines to include two-stroke and four-stroke engines, as well as spark ignition and compression ignition engines.
06	Knowledge of Units of Measurement	An understanding of common units of measurement used in maintenance applications.
07	Use and Care of Bearings	An understanding of the care and application of bearings, and the ability to recognize usual bearing failure indicators.
08	Use and Care of Gaskets and Seals	An understanding of the care, fabrication, and use of gaskets and seals, and the ability to recognize common failure indicators.
09	Basic Electricity and Magnetism	An understanding of basic AC and DC theory, Ohms law, the principles of magnetism, along with reading, interpreting, and using electrical terms, schematics, and diagrams.
10	Troubleshooting (Electrical)	An understanding of basic electrical troubleshooting logic and techniques to include the use of the multimeter and visual indicators, along with series and parallel circuit problem solving.
11	Vehicle Charging Systems	An understanding of the name, location, description, and purpose of components in the typical charging system.
12	Vehicle Electrical Systems	An understanding of the name, location, description, and function of components in vehicle electrical power distribution systems.

13	Troubleshooting (Mechanical)	An understanding of basic mechanical troubleshooting logic and techniques to include the use of standard test and diagnostic equipment and visual indicators, along with mechanical problem solving.
14	Track Vehicle Suspension Systems	An understanding of the design and operating principles of tracked vehicle suspension systems.
15	Wheel Vehicle Suspension Systems	An understanding of the design and operating principles of wheeled vehicle suspension systems.
16	Vehicle Steering Systems	An understanding of both hydraulic and manual steering systems to include troubleshooting, replacing, servicing, and adjusting components.
17	Cross-Drive Transmissions	An understanding of the design, operating principles, and functions of components cross drive transmissions.
18	Drive Line Components (Tracked Vehicles)	An understanding of the design, location, operating principles, and functions of driveline components on track vehicles.
19	Drive Line Components (Wheeled Vehicles)	An understanding of the design, location, operating principles, and functions of driveline components on wheeled vehicles.
20	Basic Hydraulics	An understanding of basic hydraulics to include the purpose, operating principles, reading and interpreting hydraulic schematic terms, symbols, and diagrams, as well as replacement of basic hydraulic components.
21	Troubleshooting (Hydraulics)	An understanding of basic hydraulic troubleshooting logic and techniques to include use of visual indicators, along with Hydraulic problem solving.
22	Brake Systems	An understanding of the design and operating principles of differing brake systems to include Hydraulic, pneumatic, and mechanical brake systems.
23	Air Induction Systems	An understanding of the operating principles of common air induction systems.
24	Ground Hopping Techniques	An understanding of ground hopping techniques to include the principles and applications of ground hopping kits, as well as field expedient methods for safely performing ground hopping operations.
25	Gas Turbine Engines	An understanding of the operating principles, description, function, and location of components of gas turbine engines.
26	Diesel Engines	An understanding of the operating principles, description, and function of components of compression ignition engines.

27	Spark Ignition Engine Systems	An understanding of the operating principles, description, function, and location of components of spark ignition engines.
28	Basic Soldering Techniques	An understanding of the purpose, care, and use of soldering irons and the function of cutting, stripping, soldering, electrical wiring and connectors.
29	Fluid Systems (Non Hydraulics)	An understanding principles, description, and location of components such as pumps, plumbing, and fittings of fluid systems other than hydraulics. This includes fuel, water, and oil systems.
30	Capabilities and Limitations of Artillery Weapons	An understanding of the characteristics and capabilities of U.S. artillery weapons.
31	Types and Capabilities of Ammunition	Knowledge of common artillery ammunition, projectiles, and their function.
32	Fuze Combinations	This knowledge includes fuzes by type and proper shell and fuze combinations.
33	PMCS Procedures	Knowledge of performing preventive maintenance checks and services (PMCS) on wheeled vehicles, tracked vehicles, signal equipment, fire direction and control equipment, and associated generator systems.
34	Map Terrain Features and Symbols	Knowledge of basic map reading. Included in this are identifying map terrain features, symbols, and colors, use of marginal information, and the determination of coordinates, elevation, and distance.
35	Azimuth Determination on Maps	Knowledge of determining azimuths, computing back azimuths and convert azimuths, and determining location by intersection and resection.
36	Radio and Radio Telephone Procedures	Knowledge of correctly setting up and operating radios and radiotelephone equipment. This includes entering, operating, and leaving a voice communications net.
37	Signal Operations Instructions, Codes	Knowledge of the structure of SOIs, identification of information to be extracted, authentication using the Dryad numerical cipher system, and encoding and decoding messages using a tactical operations code. Also includes preparation and submission of the operator's MIJI report, the recognition of ECM, and implementation of ECCM.
38	Power Converter Group (PCG)	Knowledge of the purpose, components and function of the PCG.
39	Computer Group Troubleshooting and Maintenance	Knowledge of the components and functions of the computer group. Includes an understanding of the performance of computer group trouble shooting and maintenance procedures.

40	Peripheral Device Troubleshooting and Maintenance	Knowledge of the functions, initialization, and operation of TACFIRE peripheral devices. Includes an understanding of troubleshooting and maintenance procedures for each device.
41	Division Arty Tactical Data Base	Knowledge of constructing the tactical data base to include ammunition and fire unit data, battle field geometry, map information, and meteorological data. Includes disseminating, displaying, and validating the data base.
42	Basic Mathematics	Knowledge of basic mathematics principles to include simple algebraic equations.
43	Battle Field Geometry	Knowledge of entering battle field geometry into the data base to include air corridors, restrictive fire lanes, chemical hazard areas, and other fire support coordination measures.
44	Electrical Theory	An understanding of basic AC and DC theory, Ohms law, and the principles of magnetism. This also includes reading, interpreting, and using electrical terms, schematics and diagrams.
45	Mechanical Theory	An understanding of the basic function and applied principles of mechanical devices such as wheels, pulleys, gears, and levers.
46	Plot Position	Knowledge of plotting friendly and enemy positions and identifying fire coordination measures on a map. Also includes knowledge of constructing and identifying military symbols.
47	Technical Publications	Understanding the identification and uses of the operator's technical manual (TM), lubrication orders, DA PAMs, Field Manuals (FM) and other technical publications.
48	Fire Direction System (FDS) Operational Procedures	Knowledge of preparing the FDS for operation by performing diagnostic tests, proper initialization and shutdown procedures, and performing PMCS on the FDS system.
49	Computer Terminology	Understanding of the types and classification of computers. Includes the characteristics of basic digital computers and microprocessor units, data storage devices, input/output ports, program execution, and an understanding of terms associated with computers.
50	Fire Mission Formatting	Knowledge of entering pertinent data to process a tactical solution for a fire mission.
51	Computing Firing Data	Knowledge of computing firing data to include charge deflection, quadrant, time, and when required any other fire command.
52	Computing Tactical Firing Control	Knowledge of selecting firing element(s) for fire mission(s) based on the location of the unit(s) and their ammunition and operational status.

53	Safety Procedures	Knowledge of understanding safety violations in computation of tactical fire control and firing data. Includes notification of proper headquarters in order to resolve any violations.
54	Intercommunications Equipment Operations	Knowledge of operating intercommunications equipment to include setting of switches and controls, connecting accessories, and equipment operation.
55	Antenna Installation	Knowledge of site selection, erecting, and connecting the antenna to the radio system.
56	Non-Nuclear Fire Plan	Knowledge of constructing a non-nuclear fire plan data base, and constructing, computing, and executing the plan. Also includes processing of planned minefields.
57	Control Entry to a Restricted Area	An understanding of the rules governing access to a restricted area.
58	Continuous Operations Supervision	An understanding of the mission to provide continuous resupply, maintenance, medical and administrative actions that must be handled routinely and without delays.
59	After Action Review	An understanding of AAR procedures to plan, prepare, and conduct AARs.
60	Platoon Command Post	An understanding of tactical requirements for continuous command and control of a platoon. To include perimeter defense positions for security requirements.
61	Platoon Operations Order	An understanding of the five paragraph Oporder to ensure that clear concise orders are distributed throughout the platoon. Includes situation, mission execution, service support, command, signal and supporting annexes.
62	Overlays	An understanding of operational overlays to include maneuver units, air defense and scheme of maneuver.
63	Maps and Control Measures	An understanding of maps and control measures, terrain association, contour changes, man made structures, color representation, control measure graphics, ADA symbols and graphics.
64	Degraded Operations	An understanding of degrade procedures when system failures occur.
65	Vehicle Recognition	An understanding of combat vehicles to identify them by nomenclature.

66	Autonomous Operations	An understanding of autonomous operations procedures when communications with higher headquarters is lost. Maintain current weapon control status until time limit expires then revert to weapons tight. If no time limit was established when weapons free was declared, then immediately got to weapons tight.
67	Simplified Handheld Terminal Unit	An understanding of the components to include batteries, keyboard, cables, screen and carrying case. Understanding of precision lightweight global positioning system receiver. Understanding of SINCGARS radio system. Understanding of the enhanced position location reporting system (EPLRS).
68	SINCGARS Operations	An understanding of SINCGARS radio system to include display window, cables and adapters. Understanding of terminology including manpack.
69	Visual Aircraft Recognition	An understanding of aircraft recognition to include wing, engine, fuselage, tail (WEFT) method. Regional threat aircraft list (hot list). Proper training devises as 35mm slides or computer aircraft recognition program.
70	Operational Records	Knowledge and understanding of all forms in the equipment records folder to include completing forms correctly and understanding the form's purpose and disposition.
71	Hand Signals	An understanding of visual communications and directions during operations.
72	POL	Basic knowledge of POL products to ensure proper lubricating procedures are followed as to locations and proper materials. Also knowledge of specific grades of lubricant required for outside temperature changes and intervals.

APPENDIX E

SAMPLE TKCAM ANALYSIS: HYPOTHETICAL CONSOLIDATION OF THREE CAREER MANAGEMENT FIELD 13 MOSs

SAMPLE TKCAM ANALYSIS: HYPOTHETICAL CONSOLIDATION OF THREE CAREER MANAGEMENT FIELD 13 MOSs

OVERVIEW

This appendix presents a simple example of the use of TKCAM procedures and worksheets to perform commonality analysis. The example uses data from three actual MOSs to illustrate how the TKCAM is used to determine the feasibility of consolidations among those MOSs. They are MOSs 13C TACFIRE Operations Specialist, 13E Cannon Fire Direction Specialist and 13P MLRS/Lance Operations/Fire Direction Specialist from career management field (CMF) 13.

The data that follow are for illustrative purposes only; they are not definitive. They are based on those used in a pilot study of a conceptual version of the TKCAM, but have not been verified by SMEs. Also, not all of the TKCAM steps and worksheets are shown, as some are self-explanatory. Finally, no "decisions" are based on the sample data to avoid biasing future TKCAM analyses.

STEP 2.1 IDENTIFY MOS KNOWLEDGES

POI lessons usually cover general knowledge that is applicable to more than one task. Because of this, they are good sources for identifying knowledge requirements. The lesson Map Reading, Part I in the MOS 13E10 POI, for example, covers six MOS 13E10 tasks. Figure E-1 shows one possible result of using this lesson as a source for identifying knowledge requirements. Note that a more descriptive title was used for the MOS knowledge.

STEP 3.1 PREPARE MOS KNOWLEDGE PROFILES

Figures E-2, E-3, and E-4 are replicas of completed Worksheets 3-1, MOS Knowledge Profiles, for the three sample MOSs. These profiles summarize the results of SMEs' matching knowledge requirements to MOS tasks.

Note that the knowledges are presented in numerical order. In practice they can be listed in any order (alphabetical, numerical, rank), but are easiest to compare with other profiles

COURSE: 250-13E10, Cannon Fire Direction Specialist

TRAINING ANNEX B - Target Acquisition Department

PURPOSE: To provide the student with map reading skills and knowledge to perform in MOS 13E10.

TOTAL HOURS: PEACETIME - 14.0 MOBILIZATION - 14.0

FILE NO	TITLE/SECURITY CLASSIFICATION
AN10AG	Map Reading, Part I (U) SCOPE: Identify terrain features, symbols, colors; use marginal information; determine coordinates, elevation and distance. REFERENCES: FM 21-26, STP 21-1-SMCT, STP 21-24-SMCT
AN10AH	Map Reading, Part I (U) SCOPE: Determine azimuths, compute back azimuths and convert azimuths; determine location by intersection and resection. REFERENCES: FM 21-26; STP 21-1-SMCT, STP 21-24-SMCT

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TKCAM WORKSHEET 2-1

MOS Knowledge

Associated Worksheet(s): 2-2 Verify/Modify Knowledge; 2-3 Knowledge Master List

ID Number: _____ (To be completed by TKCAM Analyst)

Source MOS: 13E

Skill Level: 1 (1, 2, 3, or 4)

Source Document(s): POI 250-13E10 Page: 12

Title: Map Terrain Features and Symbols

Suggestions for writing "Title":

1. Identify knowledge required — what does the soldier need to know.
2. Do not describe what the soldier does — that is, DO NOT WRITE TASK STATEMENTS.

Description:

(Select one if applicable) [X] Knowledge of: [ ] Understanding of: [ ] Principles of:

Basic map reading. Included are identification of map terrain features, symbols, and colors, use of marginal information, and determination of coordinates, elevation, and distance. Also include understanding of azimuths and location determination methods.

Example: Fundamentals of Electricity

An understanding of voltage, current, resistance, and use of Ohm's Law; use of electrical circuit components; electrical schematics and electrical symbols.

Preparer's Name: A Smither
Rank: SFC
MOS/AOC: 13E

Date Prepared: 11/13/93

Figure E-1. Derivation of knowledge from POI lessons.

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TKCAM WORKSHEET 3-1

MOS Knowledge Profile

Associated Worksheets:
2-3 Knowledge Master List
2-4 MOS Task List
3-2 MOS Comparison Matrix

MOS: 13C

Total Number of Knowledges for this MOS: 28

ID Number	Knowledge	Number of Tasks	Rank
1	Accurate Predicted Fire	6	9.5
4	Capabilities & Limits of Artillery Weapons	4	16.5
5	Types & Capabilities of Ammo & Fuze Comb	3	20
6	PMCS Procedures	5	12.5
12	Map Terrain Features and Symbols	5	12.5
13	Determining Azimuths on Maps	3	20
19	Radio and Radio Telephone Procedures	11	2.5
20	Signal Operations Instructions/Codes	10	4.5
21	TACFIRE Operations	11	2.5
22	Computer Communications & Message Formats	31	1
23	Basic Electrical Troubleshooting	2	23
24	Computer System Troubleshooting & Maint	5	12.5
25	Peripheral Device Troubleshooting & Maint	7	7
26	Division Artillery Tactical Data Base	10	4.5
28	Battlefield Geometry	6	9.5
29	Electrical Theory	1	26.5
31	Plot Position	4	16.5
32	Technical Publications	4	16.5
35	Computer Terminology	2	23
36	Fire Mission Formatting	7	7
38	Tactical Fire Control Computation	7	7
40	Equipment Installation	1	26.5
41	Continuity of Operations	4	16.5
42	Antenna Installation	3	20

Preparer's Name: A Swithea
Rank: SFC
MOS/AOC: 13C

Date Prepared: 11/15/93

Figure E-2. Sample MOS Knowledge Profile for MOS 13C (sample Worksheet 3-1, page 1 of 2).

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TKCAM WORKSHEET 3-1

MOS Knowledge Profile

Associated Worksheets:
2-3 Knowledge Master List
2-4 MOS Task List
3-2 MOS Comparison Matrix

MOS: 13E

Total Number of Knowledges for this MOS: 27

ID Number	Knowledge	Number of Tasks	Rank
1	Accurate Predicted Fire	11	9
2	Surveyed Firing Charts	27	5
3	Emergency Firing Chart	2	23
5	Types & Capabilities of Ammo & Free Comb	15	6
6	PMCS Procedures	4	18.5
7	Tabular Firing Tables	37	1
8	Graphical Firing Tables	33	2
9	Computation of Site	30	4
11	Manual Fire Mission Processing	31	3
12	Map Terrain Features and Symbols	7	13
13	Determining Azimuths on Maps	5	16
15	Precision Registration (Manual)	5	16
16	Graphic Intersection	5	16
17	Computer System Operations	11	9
18	Data Base Construction	10	12
19	Radio and Radio Telephone Procedures	10	12
20	Signal Operations/Instructions/Codes	11	9
21	TACFIRE Operations	2	23
22	Computer Communications & Message Formats	3	20
27	Basic Mathematics	10	12
28	Battlefield Geometry	1	26.5
31	Plot Position	1	26.5
32	Technical Publications	13	7
36	Fire Mission Formatting	4	18.5

Preparer's Name: A Swithee
Rank: SFC
MOS/AOC: 13C

Date Prepared: 11/15/93

Figure E-3. Sample MOS Knowledge Profile for MOS 13E (sample Worksheet 3-1, page 1 of 2).

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TKCAM WORKSHEET 3-1

MOS Knowledge Profile

Associated Worksheets:
2-3 Knowledge Master List
2-4 MOS Task List
3-2 MOS Comparison Matrix

MOS: 13P

Total Number of Knowledges for this MOS: 20

ID Number	Knowledge	Number of Tasks	Rank
4	Capabilities & Limits of Artillery Weapons	1	17
6	PMCS Procedures	3	9
12	Map Terrain Features and Symbols	8	2.5
13	Determining Azimuths on Maps	5	7
17	Computer System Operations	1	17
19	Radio and Radio Telephone Procedures	8	2.5
20	Signal Operations Instructions/Codes	6	5
22	Computer Communications & Message Formats	22	1
28	Battlefield Geometry	1	17
31	Plot Position	2	11.5
33	Fire Direction Control Ops Procedures	6	5
34	FDS Data Base Constructions	6	5
36	Fire Mission Formatting	2	11.5
37	Fire Data Computation	1	17
38	Tactical Fire Control Computation	2	11.5
40	Equipment Installation	1	17
42	Antenna Installation	2	11.5
46	Direct FDS Operations	1	17
47	Status Charts	1	17
48	Fire Control Element Supervision	4	8

Preparer's Name: A Smithee
Rank: SFC
MOS/AOC: 13C

Date Prepared: 11/15/93

Figure E-4. Sample MOS Knowledge Profile for MOS 13P (sample Worksheet 3-1).

when sorted in numerical order. The third column of each profile shows the number of the MOS's tasks in which a particular knowledge is used. The last column shows the relative ranks of knowledges, which are based on the number of tasks in which the knowledges are used. Those used in the most tasks have the highest ranks ("1" is the highest).

STEP 3.2 PREPARE MOS COMPARISON MATRIX

Figures E-5, E-6, and E-7 are replicas of completed Worksheets 3-2 for the three possible MOS-to-MOS combinations: 13C-to-13E, 13C-to-13P, 13E-to-13P. Comparison matrices are assembled from the knowledge profiles on Worksheets 3-1. Compare Figure E-5, the comparison matrix of MOSs 13C and 13E, with the MOS Knowledge Profiles of those MOSs (Figure E-2 and E-3). Note that they both use some of the same knowledges, like numbers 1, 5, 6, and so on. Knowledges used by both MOSs—common knowledges—are listed in the upper left-hand portion of Worksheet 3-2. What becomes important in a TKCAM analysis are those knowledges that define the differences between the MOSs.

Unique knowledges, those used by only one of the two MOSs, are listed in the upper right-hand and lower left-hand portions of the worksheet. Returning to Figure E-5, note that MOS 13C's unique knowledges with respect to MOS 13E are in the former portion; MOS 13E's with respect to MOS 13C's are in the latter.

Also note that knowledges are ranked. The ranks reflect the relative numbers of tasks in which the knowledges are used—a possible indication of their relative importance that might influence restructuring decisions. *Ranks of unique enabling criteria are not directly comparable between MOSs because they are based on different numbers of tasks in which the knowledges are used.* But they may indicate the relative importance of a knowledge to a particular MOS.

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TKCAM WORKSHEET 3-2

MOS Comparison Matrix

Associated Worksheets: 3-1 MOS Knowledge Profile

Knowledges Common to Both MOSs

ID#	Knowledge	MOS 13C Rank	MOS 13E Rank
1	Accurate Predicted Fire	9.5	9
5	Types + Capabilities of Ammo + Fuze Comb	20	6
6	PMCS Procedures	12.5	18.5
12	Map Terrain Features and Symbols	12.5	13
13	Determining Azimuths on Maps	20	16
19	Radio and Radio Telephone Procedures	2.5	12
20	Signal Operations Instructions/Codes	4.5	9
21	TACFIRE Operations	2.5	23
22	Computer Communications + Message Formats	1	20
28	Battlefield Geometry	9.5	26.5
31	Plot Position	16.5	26.5
32	Technical Publications	16.5	7
36	Fire Mission Formatting	7	18.5
42	Antenna Installations	20	23
43	Artillery TADSS Intelligence	12.5	23
48	Fire Control Element Supervision	12.5	23

Number of Knowledges: 16

Knowledges Unique to MOS: 13C

ID#	Knowledge	Rank
4	Cap Limits + Limits of Artillery Weapon	16.5
23	Basic Electrical Troubleshooting	23
24	Computer System Troubleshooting + Maint	12.5
25	Peripheral Device Troubleshooting + Maint	7
26	Division Artillery Technical Data Base	4.5
29	Electrical Theory	26.5
35	Computer Terminology	23
38	Tactical Fire Control Computation	7
40	Equipment Installation	26.5
41	Continuity of Operations	16.5
44	Emergency Field Patch	26.5
45	Control Entry to a Restricted Area	26.5

Number of Unique Knowledges: 12

Percentage of MOS's Knowledges: 43 %

Knowledges Unique to MOS: 13E

ID#	Knowledge	Rank
2	Surveyed Firing Charts	5
3	Emergency Firing Chart	23
7	Tabular Firing Tables	1
8	Graphical Firing Tables	2
9	Computations of Site	4
11	Manual Fire Mission Processing	3
15	Precision Registration (manual)	16
16	Graphic Intersection	16
17	Computer System Operations	9
18	Data Base Construction	12
27	Basic Mathematics	12

Number of Unique Knowledges: 11

Percentage of MOS's Knowledges: 41 %

Knowledges Not Used By Either MOS

ID#	Knowledge
10	Firing Battery Operations
14	Emergency Fire Mission Processing
30	Mechanical Theory
33	Fire Direction Control Ops Procedures
34	FDS Data Base Construction
37	Firing Data Computation
39	Safety Procedures
46	Direct FDS Operations
47	Status Charts

Number of Knowledges: 9

Preparer's Name: A Smithee

Rank: SFC

MOS/AOC: 13C

Date Prepared: 11/13/93

Figure E-5. MOS Comparison Matrix for MOS 13C versus MOS 13E (sample Worksheet 3-2).

Page 2 of 3

TKCAM WORKSHEET 3-2

MOS Comparison Matrix

Associated Worksheets: 3-1 MOS Knowledge Profile

Knowledges Common to Both MOSs

ID#	Knowledge	MOS 13C Rank	MOS 13P Rank
4	Capabilities & Limits of Artillery Wpns	6.5	17
6	PMCS Procedures	12.5	9
12	Map Terrain Features and Symbols	12.5	2.5
13	Determining Azimuths on Maps	20	7
19	Radio & RSdio Telephone Procedures	2.5	2.5
24	Signal Operations Instructions/Codes	4.5	5
22	Computer Communication & Message Formats	1	1
28	Battlefield Geometry	9.5	17
31	Plot Position	16.5	11.5
36	Fire Mission Formatting	7	11.5
38	Tactical Fire Control Computations	7	11.5
40	Equipment Installation	26.5	17
42	Antenna Installation	20	11.5
48	Fire Control Element Supervision	23	8
—		—	—

Number of Knowledges: 14

Knowledges Unique to MOS: 13C

ID#	Knowledge	Rank
1	Accurate Predicted Fire	6
5	Types & Capabilities of Artillery Fire Comb	3
21	TACFIRE Operations	11
23	Basic Electrical Troubleshooting	2
24	Computer System Troubleshooting & Maint	5
25	Peripheral Device Troubleshooting & Maint	7
26	Division Artillery Tactical Data Base	10
29	Electrical Theory	1
32	Technical Publications	4
35	Computer Terminology	2
41	Continuity of Operations	4
43	Artillery TARGET Intelligence	5
44	Emergency Field Patch	1
45	Control Entry to Restricted Area	1
—		—

Number of Unique Knowledges: 14

Percentage of MOS's Knowledges: 50 %

Knowledges Unique to MOS: 13P

ID#	Knowledge	Rank
17	Computer System Operations	17
33	Fire Direction Control Ops Procedures	5
34	FDS Data Base Construction	5
37	Firing Data Computation	17
46	Direct FDS Operations	17
47	Status Charts	17
—		—
—		—
—		—
—		—
—		—
—		—
—		—
—		—
—		—

Number of Unique Knowledges: 6

Percentage of MOS's Knowledges: 30 %

Knowledges Not Used By Either MOS

ID#	Knowledge
2	Surveyed Firing Charts
3	Emergency Firing Chart
7	Tabular Firing Tables
8	Graphical Firing Tables
9	Computation of Site
10	Firing Battery Operations
11	Manual Fire Mission Processing
14	Emergency Fire Mission Processing
15	Precision Registration (Manual)
16	Graphic Intersection
18	Data Base Construction
27	Basic Mathematics
30	Mechanical Theory
39	Safety Procedures
—	

Number of Knowledges: 14

Preparer's Name: A Smithee

Rank: SFC

MOS/AOC: 13C

Date Prepared: 11/13/93

Figure E-6. MOS Comparison Matrix for MOS 13C versus MOS 13P (sample Worksheet 3-2).

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TKCAM WORKSHEET 3-2

MOS Comparison Matrix

Associated Worksheets: 3-1 MOS Knowledge Profile

Knowledges Common to Both MOSs

ID#	Knowledge	MOS 13E Rank	MOS 13P Rank
6	PMCS Procedures	18.5	9
12	Map Terrain Features and Symbols	13	25
13	Determining Azimuths on Maps	16	7
17	Computer System Operations	9	17
19	Radio and Radio Telephone Procedures	12	25
20	Signal Operation Instructions/Codes	9	5
22	Computer Communication - Message Format	20	1
28	Battlefield Geometry	26.5	17
31	Plot Positions	26.5	11.5
36	Fire Mission Formatting	18.5	11.5
42	Antenna Installation	23	11.5
48	Fire Control Element Supervision	23	8

Number of Knowledges: 12

Knowledges Unique to MOS: 13E

ID#	Knowledge	Rank
1	Accurate Predicted Fire	9
2	Surveyed Firing Charts	5
3	Emergency Firing Chart	23
5	Types/Capabilities of Ammo & Fuze Comb	6
7	Tabular Firing Tables	1
8	Graphical Firing Tables	2
9	Computation of Site	4
11	Manual Fire Mission Processing	3
15	Precision Registration (Manual)	16
16	Graphic Intersection	16
18	Data Base Construction	12
21	TACFIRE Operations	23
27	Basic Mathematics	12
32	Technical Publications	7
43	Artillery TARGET Intelligence	23

Number of Unique Knowledges: 15

Percentage of MOS's Knowledges: 56 %

Knowledges Unique to MOS: 13P

ID#	Knowledge	Rank
4	Capabilities/Limits of Artillery Weapons	17
33	Fire Direction Control Ops Procedures	5
34	FDS Data Base Construction	5
37	Firing Data Computation	17
38	Tactical Fire Control Computation	11.5
40	Equipment Installation	17
46	Direct FDS Operations	17
47	Status Charts	17

Number of Unique Knowledges: 8

Percentage of MOS's Knowledges: 40 %

Knowledges Not Used By Either MOS

ID#	Knowledge
10	Firing Battery Operations
14	Emergency Fire Mission Processing
23	Basic Electrical Troubleshooting
24	Computer System Troubleshooting & Maint
25	Peripheral Device Troubleshooting & Maint
26	Division Artillery Tactical Data Base
29	Electrical Theory
30	Mechanical Theory
35	Computer Terminology
39	Safety Procedures
41	Continuity of Operations
44	Emergency Field Patch
45	Control Entry to a Restricted Area

Number of Knowledges: 13

Preparer's Name: A Smithee

Rank: SFC

MOS/AOC: 13C

Date Prepared: 11/13/93

Figure E-7. MOS Comparison Matrix for MOS 13E versus MOS 13P (sample Worksheet 3-2).

Two types of measures are displayed on the worksheet: counts of knowledges and percentages of unique knowledges. The counts are taken directly from the tallies on Worksheet 3-1. The percentages are calculated by dividing the same tallies by the number of knowledges used by each MOS, which is the total of the common knowledges and an MOS's unique knowledges.

Finally, the lower right-hand portion of the worksheet lists the knowledges from the Knowledge Master List that are not used by either MOS being compared. These knowledges are not ranked because the MOSs have no tasks that require them.

STEP 3.3 COMPUTE MOS COMMONALITY MEASURES

Figure E-8 is a completed Worksheet 3-3 for the three MOSs. It summarizes all of the comparisons between them. Compare the individual knowledge profiles (Figure E-2, E-3, and E-4) and comparison matrices (Figure E-5, E-6, and E-7) against the numbers in Worksheet 3-3. The procedures in this step are straightforward; all of the numbers in the worksheet are either copied from other worksheets or derived from them through simple calculations, like averages.

Page 1 of 1

Iteration 1

TKCAM WORKSHEET 3-3

MOS Commonality Measures

Associated Worksheets: 3-2 MOS Comparison Matrix

MOS	Number of Knowledges	% Knowledges in Common with Other MOS	Number of Unique Knowledges	Sum of Ranks	Average Rank	Total Number of Unique Knowledges	Grand Sum of Ranks	Grand Avg. of Ranks
13C	28	60	12	216	18	23	319	14
13E	27	60	11	103	9			
13C	28	50	14	62	4	20	140	7
13P	20	70	6	78	13			
13E	27	40	15	162	11	23	268.5	12
13P	20	60	8	106.5	13			

Preparer's Name: A Smithee
Rank: SFC
MOS/AOC: 13C

Date Prepared: 11/13/93

Figure E-8. Summary of the sample commonality analysis between MOS 13C, MOS 13E, and MOS 13P (sample Worksheet 3-3).

APPENDIX F

SUBJECT MATTER EXPERT PANEL #1
ORIENTATION PACKAGE

SME PANEL #1 ORIENTATION PACKAGE

This briefing guide has been prepared for the TKCAM Analyst to use in orienting members of SME Panel #1. The orientation briefing is designed to familiarize the SMEs with what TKCAM is, what their roles are as members of the first TKCAM panel, and how they can accomplish their principal task, namely, identifying and describing knowledges required for their respective MOSs.

The briefing guide is presented in two parts: (1) a briefing script and (2) a set of briefing charts. The script describes the key points of information that the TKCAM Analyst needs to explain to the SMEs. The briefing charts can be used along with the script in making an orientation briefing to the SMEs. In addition, the charts may be distributed to the SMEs with or without the script as the TKCAM Analyst chooses.

BRIEFING SCRIPT

CHART 1: WHAT IS TKCAM?

Issues are frequently raised in regards to restructuring existing MOSs. The restructuring may involve combining existing MOSs, breaking them apart into more specialized MOSs, or changing an MOS's task content or other features, among possible types of restructurings.

When the need arises, Army regulations, particularly, AR 611-1, Military Occupational Classification Structure Development and Implementation, and AR 611-201, Enlisted Career Management Fields and Military Occupational Specialties, specify the procedural requirements for making such changes. These regulations and other Army guidance, however, generally do not explain how to arrive at restructuring decisions. That is, how are such decisions made?

TKCAM, the Task Knowledges Commonality Analysis Method, is one method to aid in systematically assessing the feasibility of restructuring MOSs based on common knowledge requirements. TKCAM is designed to be used in a relatively short time frame with a minimal level of effort by analysts, who are not necessarily specialists in occupational analysis.

CHART 2: THE MOS COMPARISON MATRIX: A SYSTEMATIC WAY TO ASSESS FEASIBILITY

TKCAM's principal means for introducing reason into the restructuring decision is a comparison of the knowledge requirements between two MOSs. Using the TKCAM procedures, a comparison matrix is developed which identifies the common and unique knowledge requirements.

In the "northwest" corner of the matrix, the knowledges that are common to both MOSs are listed. In the "southwest" and "northeast" quadrants are listed the knowledges that are unique to one or the other MOS. When there are mostly common knowledge requirements and few unique requirements, restructuring the MOSs may be feasible from the perspective of their knowledge requirements. Since the "knowledge requirements" may also be indicators of job complexity, training demands, among other job characteristics, such information can be very useful in establishing the feasibility of a restructuring.

The comparison matrix is developed using a set of knowledge requirements. The knowledges are developed by SMEs, usually senior NCOs with both field and training experience, who work together for 2-3 days. Their job is to identify and briefly describe all the knowledges associated with their MOS.

CHART 3: THE ROLE OF SUBJECT MATTER EXPERTS ON PANEL #1

In conducting a TKCAM application, there are three SME panels which help develop the knowledge data that are used to build the comparison matrix. The purpose of the first panel is to identify and describe the knowledge requirements of the MOSs being considered for restructuring.

For each MOS, there are two SMEs, who will work together in subgroups. Their task is to identify and describe knowledge requirements. To accomplish this task, the SMEs need to know:

- What "knowledges" are in TKCAM,
- How to identify knowledges, and,
- How to document knowledges.

The purpose of this briefing is to provide SMEs serving on the first panel with these basic understandings.

A second panel will review, verify, and modify as necessary the knowledge requirements identified by the first panel. The third panel will match the knowledges to tasks; these matches are used to build MOS knowledge profiles and the MOS Comparison Matrix.

CHART 4: SAMPLE KNOWLEDGE MASTER LIST

This chart illustrates the first page of a Knowledge Master List developed as part of a TKCAM application done at Fort Sill in 1993. The list contains about 75 knowledges, all tied to one or more fire direction control MOSs.

There are two key elements to describing a knowledge: (1) its title and (2) its description. SMEs are responsible for identifying the knowledges and documenting them in terms of these two elements using TKCAM Worksheet 2-1.

CHART 5: WHAT ARE "KNOWLEDGES"?

"Knowledges" are what soldiers need to know to perform their jobs. These are specific classifications of theoretical and practical knowledge. They are not specifically task related, that is, one or more may be required to perform a task and more than one task may require the same knowledge(s).

Examples of knowledges are "Principles of Electricity" and "Accurate Predicted Fire", both of which were identified as part of TKCAM application related to field artillery. "M109 Turret Electrical Schematics" is an example of a type of knowledge which, in the particular application, was considered to be too specific and too task-related because of its "M109 Turret" reference; understanding and interpreting electrical schematics without qualification would have been appropriate.

Note to TKCAM Analyst: For more examples, refer to Appendix D: Sample Knowledges.

CHART 6: CATEGORIES OF KNOWLEDGES

There are three categories of knowledges: theory, method, and object. Identifying knowledges related to theory, then method, and then object may make the process easier for the SMEs.

"Theory" knowledges are single theoretical concepts, scientific principles, doctrines, sets of rules or bodies of knowledge. Examples include: Mathematics, Electricity, Cryptography, among others. In identifying these type of knowledges, the SMEs need to consider what theory or concepts the soldier needs to know.

"Method" knowledges relate to procedures or techniques that exist independent of any one equipment item with which the soldier must have knowledge. Examples include: Electrical Troubleshooting, Arc Welding, Map Reading, among others. In listing these type of knowledges, the SMEs need to identify procedures or techniques the soldier needs to know.

"Object" knowledges are physical items or classes of items about which the soldier must have knowledge in order to perform a task. Examples include: Technical Manuals, Track Vehicle Suspension Systems, among others.

Knowing and working with these categories when initially identifying knowledges can be helpful. Generally, TKCAM does not make use of these categories beyond the process of identifying knowledges.

CHART 7: KNOWLEDGE FORMAT

A TKCAM application is documented, usually using standard TKCAM worksheets, as each step is performed. For the process of identifying and describing knowledges, TKCAM Worksheet 2-1, MOS Knowledge, is used.

There are two main components to the worksheet: Title and Description.

The "Title" is a brief, descriptive statement of the knowledge. It is not a task statement.

The "Description" elaborates on the title indicating concepts, scope, and depth of the knowledge.

In addition, there is a place on the worksheet to record the source used to identify the knowledge. This may be a document such as a program of instruction (POI) or it could be the "SME's expertise".

CHART 8: KNOWLEDGE FORMAT: TITLES

When writing titles, use brief, descriptive statements. Begin with the most important element first. For example, "Troubleshooting of Pneumatics" might be written as "Pneumatics, Troubleshooting of".

In developing a list of knowledges, think in terms of what the soldier needs to know. Do not describe what the soldier does --- that is, do not write task statements.

CHART 9: KNOWLEDGE FORMAT: DESCRIPTIONS

When writing descriptions, elaborate on knowledge expressed in title. List related concepts, components, or methods.

Descriptions may be patterned after format used in POIs.

Often, beginning descriptions with phrases such as: "Knowledge of....", Principles of....", or "Understanding of...." helps set the proper tone.

CHART 10: SOURCES OF KNOWLEDGES

Recording the source of the knowledges in TKCAM is important in establishing an audit trail in the typical TKCAM application.

In addition to the SME's experience, there are various documents from which knowledges may be extracted. For "theory" knowledges, the initial POI training annex or annexes are useful sources.

For "object" and "method" knowledges, use POIs, soldier's manuals, and technical manuals.

From wherever the knowledges were derived, record the source on the worksheet so that its origin can be identified and follow-up may occur if the TKCAM Analyst has need.

CHART 11: WORK PLAN FOR DEVELOPING KNOWLEDGES

The TKCAM Analyst, in conjunction with the SMEs, should establish a work plan to guide and control the effort. The plan should include the following tasks.

First, the SMEs should collect and review source material including POIs, SMs, FMs, and related documents. Read through these resources to develop a familiarity with their contents and insights how this material may be used in identifying and describing knowledges.

Second, the SMEs should review Appendix C: Knowledge Guidelines, which provides guidance for developing knowledges, and Appendix D: Sample Knowledges, which contains examples of knowledges extracted from previous TKCAM applications. The SMEs should look at these samples to develop an understanding of what knowledges are in TKCAM. Then, they should examine the list a second time, circling any knowledges which may be applicable to the MOSs under study.

Third, the SMEs should develop an initial list of knowledges. They should write down "Titles" and "Sources" only. In developing the list, the SMEs should refer to the source material, the sample list, and draw on their own experience. Sometimes, the process of identifying knowledges is easier if attention is focused, first, on theory, then method, then objects.

Fourth, after the initial list has been developed, the TKCAM Analyst and SMEs should review their work and consider whether there are any omissions. If so, the additional knowledges should be added to the list.

Fifth, using Worksheet 2-1, transfer the "Title" and "Source" and write a brief description. Often, beginning a description with phrases such as "Knowledge of....", "Understanding of....", or "Principles of....", as examples, helps writing good descriptions as well as avoids writing task statements.

After the SMEs have worked for about an hour or so writing descriptions, the TKCAM Analyst should review the work (Worksheets 2-1) for its completeness, correctness, and consistency. The initial descriptions may be circulated among all the panel members so that, together, they can arrive at a common approach and common language. The TKCAM Analyst should lead this review.

When all knowledges have been identified and described on Worksheets 2-1, the worksheets should be provided to the TKCAM Analyst for final review. When the documentation appears complete, the TKCAM Analyst may release the SMEs allowing them to return to their regular duties.

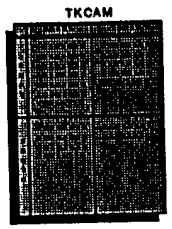
This entire process for SME Panel #1 typically takes 2-3 days.

The worksheets will then be turned over to SME Panel #2. Its responsibility is to verify the knowledges derived for each MOS. The TKCAM Analyst then organizes and consolidates the MOS knowledges into one package, producing finally the Knowledge Master List.

Note to TKCAM Analyst:

In concluding the orientation, the TKCAM Analyst should provide the SMEs with some examples illustrating how knowledges are identified from source material and how they are documented on Worksheets 2-1. To accomplish this, the TKCAM Analyst should prepare several examples prior to the orientation.

BRIEFING CHARTS



TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

WHAT IS TKCAM?

Issues frequently are raised in regards to restructuring MOSs.

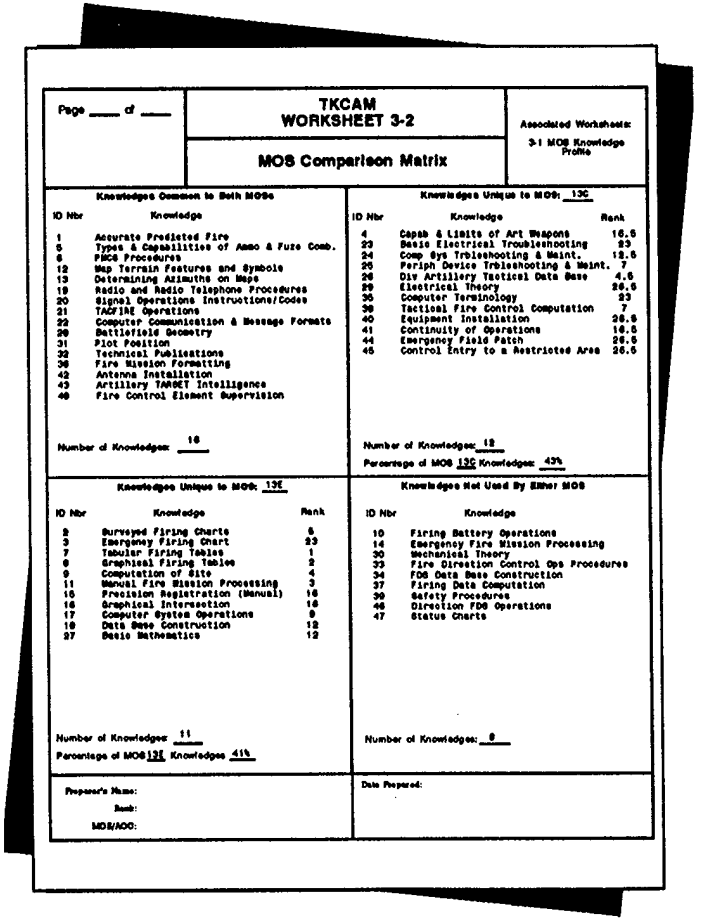
AR 611-1, Military Occupational Classification Structure Development and Implementation, states the requirements for restructuring.

But, it does not explain how.

TKCAM is one method to aid in systematically assessing the feasibility of restructuring MOSs based on common knowledge requirements.

TKCAM

TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD



Page ____ of ____

TKCAM WORKSHEET 3-2

MOS Comparison Matrix

Associated Worksheets: 3-1 MOS Knowledge Profile

Knowledges Common to Both MOSs

ID Nbr	Knowledge
1	Accurate Predicted Fire
5	Types & Capabilities of Ammo & Fuze Comb.
6	FDCS Procedures
12	Map Terrain Features and Symbols
13	Determining Azimuths on Maps
19	Radio and Radio Telephone Procedures
20	Signal Operations Instructions/Codes
21	TACFIRE Operations
22	Computer Communication & Message Formats
29	Battlefield Geometry
31	Plot Position
32	Technical Publications
36	Fire Mission Formatting
42	Antenna Installation
43	Artillery TARGET Intelligence
46	Fire Control Element Supervision

Number of Knowledges: 16

Knowledges Unique to MOS: 13C

ID Nbr	Knowledge	Rank
4	Capab & Limits of Art Weapons	16.5
23	Basic Electrical Troubleshooting	23
24	Comp Sys Troubleshooting & Maint.	16.5
25	Periph Device Troubleshooting & Maint.	7
26	Div Artillery Tactical Data Base	4.5
28	Electrical Theory	26.5
35	Computer Terminology	23
39	Tactical Fire Control Computation	7
40	Equipment Installation	26.5
41	Continuity of Operations	16.5
44	Emergency Field Patch	26.5
45	Control Entry to a Restricted Area	26.5

Number of Knowledges: 12

Percentage of MOS 13C Knowledges: 43%

Knowledges Unique to MOS: 13E

ID Nbr	Knowledge	Rank
2	Surveyed Firing Charts	5
3	Emergency Firing Chart	23
7	Tabular Firing Tables	1
8	Graphical Firing Tables	2
9	Computation of Site	4
11	Manual Fire Mission Processing	3
15	Precision Registration (Manual)	16
16	Graphical Intersection	16
17	Computer System Operations	8
18	Data Base Construction	12
27	Basic Mathematics	12

Number of Knowledges: 11

Percentage of MOS 13E Knowledges: 41%

Knowledges Not Used By Either MOS

ID Nbr	Knowledge
10	Firing Battery Operations
14	Emergency Fire Mission Processing
30	Mechanical Theory
33	Fire Direction Control Ops Procedures
34	FDC Data Base Construction
37	Firing Data Computation
38	Safety Procedures
48	Direction FDC Operations
47	Status Charts

Number of Knowledges: 8

Preparer's Name:

Rank:

MOS/AOC:

Date Prepared:

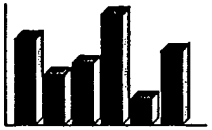
TKCAM provides a systematic procedure to identify *common* and *unique* knowledge requirements between two MOSs.

TKCAM

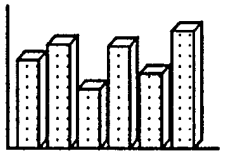
TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

THE ROLE OF SUBJECT MATTER EXPERTS

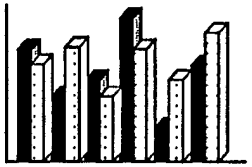
SME PANELS
Senior Enlisted Personnel



MOS X KNOWLEDGE REQUIREMENTS



MOS Y KNOWLEDGE REQUIREMENTS



SIMILARITIES & DIFFERENCES?

- Assemble knowledge requirements
- Verify representativeness and completeness
- Assign knowlege requirements to MOS tasks

CHART 3

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TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

SAMPLE KNOWLEDGE MASTER LIST

Page ___ of ___

TKCAM WORKSHEET 2-3

Knowledge Master List

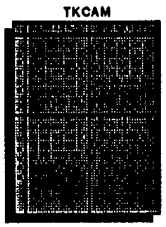
Associated Worksheet(s)
2-1 MOS Knowledge
2-2 Verify/Modify Knowledge

ID Number	Title	Description
01	Accurate Predicted Fire.	Knowledge of the five required elements for accurate predicted fire and their relation to cannon fire direction
02	Surveyed Firing Charts and Chart Data.	Knowledge of constructing a firing chart, plotting critical and non critical firing points, primary and secondary azimuth, and deflection indexes. This also includes the ability to identiyf and explain the uses for FDC chart equipment.
03	Emergency Firing Chart.	Knowledge of constructing an emergency observed firing chart and determining initial and subsequent data.
04	Capabilities and Limitations of Artillery Weapons.	An understanding of the characteristics and capabilities of U.S. artillery weapons.
05	Types and Capabilities of Ammunition and Fuze Combinations.	Knowledge of common artillery amunition, projectiles, and their function. This knowledge includes fuzes by type and propoer shell and fuze combinations.
06	PMCS Procedures.	Knowledge of performing preventive maintenance checks and services (PMCS) on wheeled vehicles, tracked vehicles, signal equipment, fire direction and control equipment, and associated generator systems.
07	Back-up Computer System.	Knowledge of the names, locations and functions of components on the BUCS. This includes understanding of the capabilities, limitations, uses of the system.

Preparer's Name:
Rank:
MOS/ASI:

Date Prepared:

Based on USAFAS AFATDS MOS Project, 1993



TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

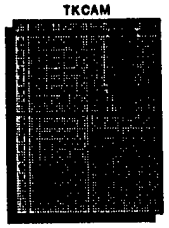
WHAT ARE "KNOWLEDGES" IN TKCAM?

"Specific classifications of knowledge needed by soldiers to perform in their MOSs. These are separate and discrete elements of generally theoretical or practical knowledge and not specifically task related."

---TKCAM User's Guide

EXAMPLES

- ✓ Principles of Electricity
- ✓ Accurate Predicted Fire
- ✗ M109 Turret Electrical Schematics



TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

CATEGORIES OF KNOWLEDGES

THEORY	Single theoretical concept, scientific principle, doctrine, set of rules or body of knowledge.
	Examples: Mathematics, Electricity, Cryptography
OBJECT	Physical items or classes of items about which the soldier must have knowledge in order to perform a task.
	Examples: Technical Manuals, Track Vehicle Suspension Systems
METHOD	Procedures or techniques that exist independent of any one equipment item with which the soldier must have knowledge.
	Examples: Electrical Troubleshooting, Arc Welding

TKCAM

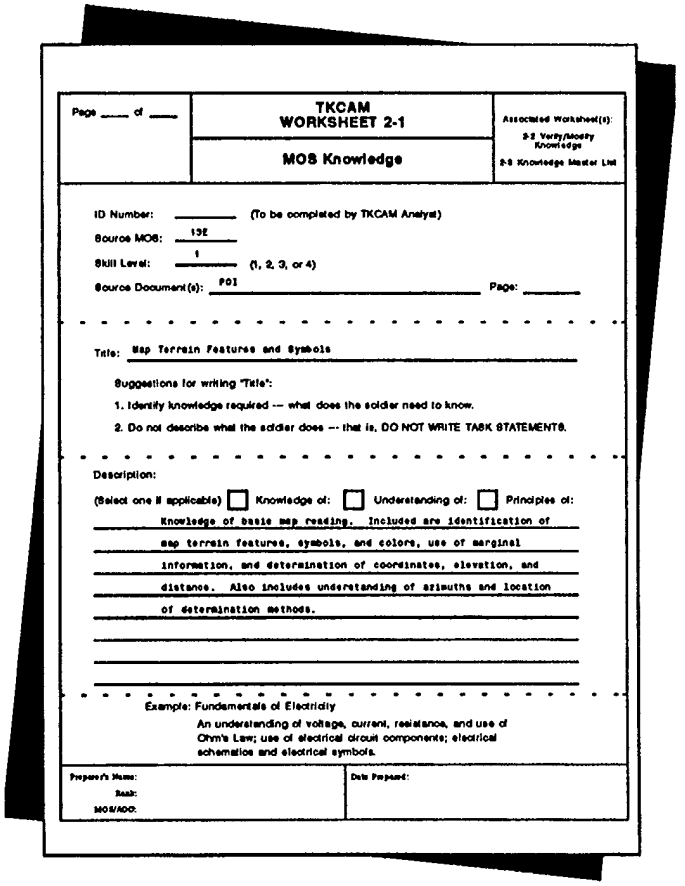
TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

KNOWLEDGE FORMAT

TWO KEY COMPONENTS:

- Title
- Description

plus Sources



Page ___ of ___

TKCAM WORKSHEET 2-1

MOS Knowledge

Associated Worksheet(s):
2-2 Verify/Modify Knowledge
2-3 Knowledge Master List

ID Number: _____ (To be completed by TKCAM Analyst)
Source MOS: 13E
Skill Level: 1 (1, 2, 3, or 4)
Source Document(s): POI Page: _____

Title: Map Terrain Features and Symbols

Suggestions for writing "Title":
1. Identify knowledge required -- what does the soldier need to know.
2. Do not describe what the soldier does -- that is, DO NOT WRITE TASK STATEMENTS.

Description:
(Select one if applicable) ☐ Knowledge of: ☐ Understanding of: ☐ Principles of:
Knowledge of basic map reading. Included are identification of map terrain features, symbols, and colors, use of marginal information, and determination of coordinates, elevation, and distance. Also includes understanding of azimuths and location of determination methods.

Example: Fundamentals of Electricity
An understanding of voltage, current, resistance, and use of Ohm's Law; use of electrical circuit components; electrical schematics and electrical symbols.

Preparer's Name:
Rank:
MOS/AOC:
Date Prepared:

CHART 7

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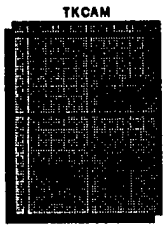


TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

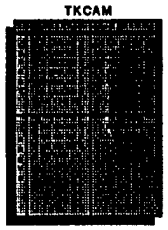
KNOWLEDGE FORMAT: TITLES

GUIDELINES

Brief, descriptive statements.
Begin with the most important element.

EXAMPLES

Theory	Electrical Theory; Circuits, Basic
Object	Batteries; Fire Control Systems
Method	Pneumatics, Troubleshooting of; Rigging



TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

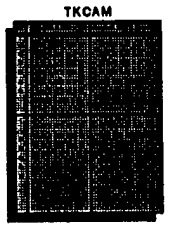
KNOWLEDGE FORMAT: DESCRIPTIONS

GUIDELINES

Elaborate on knowledge expressed in title.
List related concepts, components, or methods.
Define range and depth of knowledge.
Pattern after POI style and wording.

EXAMPLES

THEORY	Understanding of the electron theory of current flow, conductivity, negative electron methods of producing voltage, and components of electricity and their symbols. Includes understanding of the relationships between current, voltage, and resistance (Ohm's Law).
OBJECT	Knowledge of basic map reading. Included are identification of map terrain features, symbols and colors, use of marginal information, and determination of coordinates, elevation and distance.
METHOD	Knowledge of rigging techniques such as knot tying, construction of rope bridges, and preparing simple tackle systems.



TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

SOURCES OF TKCAM KNOWLEDGES

THEORY — Initial POI training annex or annexes

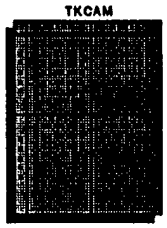
- List all elements in the scope description for each knowledge.

OBJECT — POIs, soldier's manuals, technical manuals

- Use POI file titles.
- Use tech manual tasks involving a specific object, e.g., recoil system.

METHOD — POIs, tech manuals, AR 611-201 duties and task descriptions

- Look for techniques, e.g., diagnostics, planning, troubleshooting, etc.



TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

DEVELOPING KNOWLEDGES: WORK PLAN

Steps for Developing Knowledges

- ▸ Review Source Material
- ▸ Review Sample Lists
- ▸ Develop Initial List - "Titles" and "Sources" Only
- ▸ Review List for Completeness
- ▸ Write Descriptions

TKCAM STEP 2.1
SME PROCEDURES
SUMMARY SHEET

Identify MOS Knowledges

☐ 1. Participate in SME Panel #1 Orientation Briefing. Complete TKCAM SME Information Form (Appendix B).

☐ 2. Review Appendix C: Knowledge Guidelines and Appendix D: Sample Knowledges.

☐ 3. Collect and Review Source Material --- POIs, SMs, TMs, etc.

☐ 4. Develop Initial List of Knowledges --- Write "Titles" and "Sources" Only.

Hints:

▸When identifying/listing knowledges:

a. Think first in terms of theory (for example, Basic Mathematics), then method (for example, PMCS), and then objects (for example, Technical Publications)

b. For each category (theory, method, object), identify knowledges by reviewing documentation and the sample knowledges (Appendix C). Also, draw on your experience --- what does the soldier with your MOS need to know?

▸When writing titles:

a. State subject or function first.
For example, "PMCS", "Basic Mathematics";
Then, state qualifiers, if any.
For example, "PMCS Avenger".

b. Identify knowledge required --- what does the soldier need to know?

c. Do not describe what the soldier does --- that is, do no write task statements.

☐ 5. Review Initial List for Completeness (Draw on Your Experience). Add any additional enabling criteria to the initial list.

☐ 6. Using Worksheet 2-1 for Each Knowledge, Write Description.

Hint:

▸When writing description, begin with phrase such as:
Knowledge of.....
Understanding of.....
Principles of.....

☐ 7. When All Knowledges Have Been Described on Worksheets 2-1, Turn in to TKCAM Analyst for Review.

APPENDIX G

SUBJECT MATTER EXPERT PANEL #2
ORIENTATION PACKAGE

SME PANEL #2 ORIENTATION PACKAGE

This briefing guide has been prepared for the TKCAM Analyst to use in orienting members of SME Panel #2. The orientation briefing is designed to familiarize the SMEs with what TKCAM is, what their roles are as members of the second TKCAM panel, and how they can accomplish their principal task, namely, verifying the completeness and accuracy of the knowledges identified by the first SME panel.

The briefing guide is presented in two parts: (1) a briefing script and (2) a set of briefing charts. The script describes the key points of information that the TKCAM Analyst needs to explain to the SMEs. The briefing charts can be used along with the script in making an orientation briefing to the SMEs. In addition, the charts may be distributed to the SMEs with or without the script as the TKCAM Analyst chooses.

BRIEFING SCRIPT

CHART 1: WHAT IS TKCAM?

Issues are frequently raised in regards to restructuring existing MOSs. The restructuring may involve combining existing MOSs, breaking them apart into more specialized MOSs, or changing an MOS's task content or other features, among possible types of restructurings.

When the need arises, Army regulations, particularly, AR 611-1, Military Occupational Classification Structure Development and Implementation, and AR 611-201, Enlisted Career Management Fields and Military Occupational Specialties, specify the procedural requirements for making such changes. These regulations and other Army guidance, however, generally do not explain how to arrive at restructuring decisions. That is, how are such decisions made?

TKCAM, the Task Knowledges Commonality Analysis Method, is one method to aid in systematically assessing the feasibility of restructuring MOSs based on common knowledge requirements. TKCAM is designed to be used in a relatively short time frame with a minimal level of effort by analysts, who are not necessarily specialists in occupational analysis.

CHART 2: THE MOS COMPARISON MATRIX: A SYSTEMATIC WAY TO ASSESS FEASIBILITY

TKCAM's principal means for introducing reason into the restructuring decision is a comparison of the knowledge requirements between two MOSs. Using the TKCAM procedures, a comparison matrix is developed which identifies the common and unique knowledge requirements.

In the "northwest" corner of the matrix, the knowledges that are common to both MOSs are listed. In the "southwest" and "northeast" quadrants are listed the knowledges that are unique to one or the other MOS. When there are mostly common knowledge requirements and few unique requirements, restructuring the MOSs may be feasible from the perspective of their knowledge requirements. Since the "knowledge requirements" may also be indicators of job complexity, training demands, among other job characteristics, such information can be very useful in establishing the feasibility of a restructuring.

The comparison matrix is developed using a set of knowledge requirements. The knowledges are developed by SMEs, usually senior NCOs with both field and training experience, who work together for 2-3 days. Their job is to identify and briefly describe all the knowledges associated with their MOS.

CHART 3: THE ROLE OF SUBJECT MATTER EXPERTS ON PANEL #2

In conducting a TKCAM application, there are three SME panels which help develop the knowledge data that are used to build the comparison matrix. The purpose of the first panel is to identify and describe the knowledge requirements of the MOSs being considered for restructuring. These are documented using TKCAM Worksheets 2-1.

Then, a second panel, comprised of two SMEs for each MOS working together in subgroups, reviews and verifies the knowledges to insure their completeness and accuracy. Then, the knowledges can be organized by the TKCAM Analyst into a Knowledge Master List. To accomplish this task, the SMEs need to know:

- What "knowledges" are in TKCAM,
- How to review and verify knowledges, and,
- How to determine their completeness and accuracy.

The purpose of this briefing is to provide SMEs serving on the second panel with these basic understandings.

After the second panel completes its work, a third panel will match the knowledges to tasks; these matches are used to build MOS knowledge profiles and the MOS Comparison Matrix.

CHART 4: SAMPLE KNOWLEDGE MASTER LIST

This chart illustrates the first page of a Knowledge Master List developed as part of a TKCAM application done at Fort Sill in 1993. The list contains about 75 knowledges, all tied to one or more fire direction control MOSs.

There are two key elements to describing a knowledge: (1) its title and (2) its description. SMEs on the first panel are responsible for identifying the knowledges and documenting them in terms of these two elements using TKCAM Worksheet 2-1. SMEs on the second panel are responsible for reviewing the first panel's worksheets insuring that the set of knowledges is complete and that the individual knowledges are identified and described accurately. The TKCAM Analyst assembles this material into a Knowledge Master List (Worksheet 2-3).

CHART 5: WHAT ARE "KNOWLEDGES"?

"Knowledges" are what soldiers need to know to perform their jobs. These are specific classifications of theoretical and practical knowledge. They are not specifically task related, that is, one or more may be required to perform a task and more than one task may require the same knowledge(s).

Examples of knowledges are "Principles of Electricity" and "Accurate Predicted Fire", both of which were identified as part of TKCAM application related to field artillery. "M109 Turret Electrical Schematics" is an example of a type of knowledge which, in the particular application, was considered to be too specific and too task-related because of its "M109 Turret" reference; understanding and interpreting electrical schematics without qualification would have been appropriate.

Note to TKCAM Analyst: For more examples, refer to Appendix D: Sample Knowledges.

CHART 6: CATEGORIES OF KNOWLEDGES

There are three categories of knowledges: theory, method, and object. Identifying knowledges related to theory, then method, and then object may make the process easier for the SMEs.

"Theory" knowledges are single theoretical concepts, scientific principles, doctrines, sets of rules or bodies of knowledge. Examples include: Mathematics, Electricity, Cryptography, among others. In identifying these type of knowledges, the SMEs need to consider what theory or concepts the soldier needs to know.

"Method" knowledges relate to procedures or techniques that exist independent of any one equipment item with which the soldier must have knowledge. Examples include: Electrical Troubleshooting, Arc Welding, Map Reading, among others. In listing these type of knowledges, the SMEs need to identify procedures or techniques the soldier needs to know.

"Object" knowledges are physical items or classes of items about which the soldier must have knowledge in order to perform a task. Examples include: Technical Manuals, Track Vehicle Suspension Systems, among others.

Knowing and working with these categories when initially identifying knowledges can be helpful. Generally, TKCAM does not make use of these categories beyond the process of identifying knowledges.

CHART 7: KNOWLEDGE FORMAT

A TKCAM application is documented, usually using standard TKCAM worksheets, as each step is performed. For the process of identifying and describing knowledges, TKCAM Worksheet 2-1, MOS Knowledge, is used.

There are two main components to the worksheet: Title and Description.

The "Title" is a brief, descriptive statement of the knowledge. It is not a task statement.

The "Description" elaborates on the title indicating concepts, scope, and depth of the knowledge.

In addition, there is a place on the worksheet to record the source used to identify the knowledge. This may be a document such as a program of instruction (POI) or it could be the "SME's expertise".

CHART 8: KNOWLEDGE FORMAT: TITLES

When reviewing titles, verify that they are brief, descriptive statements. Begin with the most important element first. For example, "Troubleshooting of Pneumatics" might be written as "Pneumatics, Troubleshooting of".

In reviewing the knowledges identified and described on Worksheets 2-1, think in terms of what the soldier needs to know. The knowledges should not describe what the soldier does --- that is, they should state knowledges; they should not be task statements.

CHART 9: KNOWLEDGE FORMAT: DESCRIPTIONS

When reviewing descriptions, verify that they elaborate on knowledge expressed in title. The descriptions should list related concepts, components, or methods.

Descriptions may be patterned after format used in POIs.

Often, beginning descriptions with phrases such as: "Knowledge of....", Principles of....", or "Understanding of...." helps set the proper tone and avoids descriptions that are task statements.

CHART 10: TKCAM WORKSHEET 2-2: VERIFY/MODIFY KNOWLEDGES

Changes to the knowledges described on Worksheets 2-1 are recorded on Worksheets 2-2. If, for example, two enabling criteria are being combined, the new title and description are written in the space provided. In addition, a brief explanation of the reason for the change is also recorded. The original Worksheet 2-1 is stapled behind the Worksheet 2-2. When all Worksheets 2-1 have been reviewed, the proposed changes recorded on Worksheets 2-1 are forwarded to the TKCAM Analyst for review and approval. Once accepted, the modified knowledges are included in the set that is used to build the Knowledge Master List.

CHART 11: WORK PLAN FOR VERIFYING/MODIFYING KNOWLEDGES

The TKCAM Analyst, in conjunction with the SMEs, should establish a work plan to guide and control the effort. The plan should include the following tasks.

First, the SMEs should collect and review source material including POIs, SMs, and related documents. Read through these resources to develop a familiarity with their contents and insights how this material may be used to verify or modify knowledges developed by the first SME panel.

Second, the SMEs should review the sample knowledges listed in Appendix D. These knowledges have been extracted from previous TKCAM applications. The SMEs should look at these to develop an understanding of what knowledges are in TKCAM.

Third, the SMEs should review the guidelines for describing and verifying knowledges in Appendix C. The guidelines explain what knowledges are and how to verify knowledges, among other topics.

Having familiarized themselves with the material and tasks, the members of the second SME panel should divide themselves into subgroups for each MOS. The subgroups should perform the next three steps.

Fourth, the SMEs should review the knowledges documented on Worksheets 2-1 by the first SME panel. They should make an initial pass through the worksheets for their MOS and consider whether the worksheets are complete. For each knowledge, there should be an entry for Source MOS, Skill Level, Source Document, Title, and Description. Any missing items should be added. This is the first pass through Worksheets 2-1.

Fifth, the Worksheets 2-1 should be reviewed a second time to insure there are no omissions. To determine that knowledges have not been omitted by the first panel, the SMEs should review the source material as well as draw upon their own field experience. For each additional knowledge that needs to be specified, the SMEs should fill out an additional Worksheet 2-1.

Sixth, the SMEs should make a third pass through the Worksheets 2-1 insuring that the knowledges are described consistently and accurately. The descriptions of the knowledges should be checked to make sure they describe knowledges and not tasks. The knowledges should be reviewed to insure their titles and descriptions reflect the same level of detail, are accurate (based on the SMEs' experience and knowledge of the source material), and have relatively the same amount of content. In instances where any one or a combination of these conditions is not met, the SMEs should rewrite the title and description on Worksheet 2-2, staple the original Worksheet 2-1 behind, and submit the package to the TKCAM Analyst for review and approval.

Having verified and modified the knowledges for their own MOSs, the SMEs or a subgroup including representatives for each MOS included in the TKCAM application should complete the review by looking for knowledges that can be combined or should be eliminated. The panel or subpanel should perform the following two final steps.

Seventh, in a fourth pass of the Worksheets 2-1, the SMEs (as a group or subgroup) should review all the knowledges looking for similar or related knowledges that may be combined into a single knowledge. For those that can be combined, the SMEs should rewrite the title and description on Worksheet 2-2, staple the original Worksheets 2-1 behind, and submit the package to the TKCAM Analyst for review and approval.

Finally, the SMEs in a fifth and final pass, should review the knowledges to determine whether there are any that seem inappropriate for the MOSs and TKCAM application. If so, the SMEs should recommend its deletion using Worksheet 2-2 which should be provided to the TKCAM Analyst for review and approval.

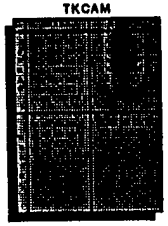
When all enabling criteria have been reviewed and verified, the TKCAM Analyst may release the SMEs allowing them to return to their regular duties. This entire process for SME Panel #2 usually takes 1-2 days.

Once the worksheets have been reviewed and verified, the TKCAM Analyst organizes them into a logical sequence. These are then used to prepare the Knowledge Master List, which is used by the third SME panel along with task lists to match knowledges to tasks and build the MOS Knowledge Profiles for each MOS included in the TKCAM analysis.

Note to TKCAM Analyst:

In concluding the orientation, the TKCAM Analyst should provide the SMEs with some examples illustrating how knowledges documented on Worksheets 2-1 were modified using Worksheet 2-2. To accomplish this, the TKCAM Analyst should prepare several examples prior to the orientation. Examples of duplication and poor specification should be presented.

BRIEFING CHARTS



TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

WHAT IS TKCAM?

Issues frequently are raised in regards to restructuring MOSs.

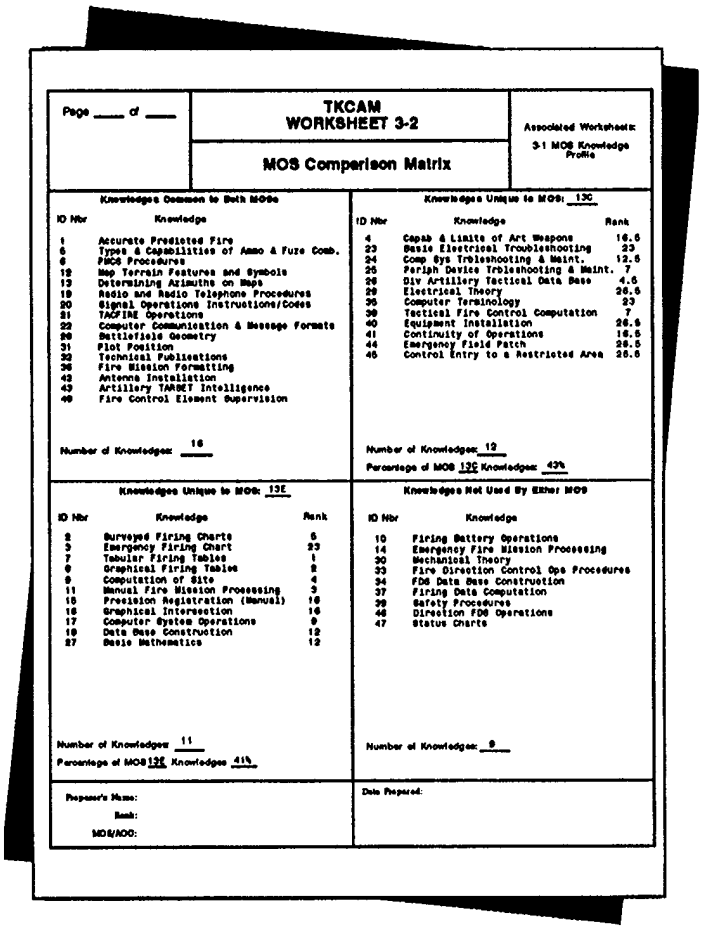
AR 611-1, Military Occupational Classification Structure Development and Implementation, states the requirements for restructuring.

But, it does not explain how.

TKCAM is one method to aid in systematically assessing the feasibility of restructuring MOSs based on common knowledge requirements.

TKCAM

TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD



Page ____ of ____

TKCAM WORKSHEET 3-2

MOS Comparison Matrix

Associated Worksheets: 3-1 MOS Knowledge Profile

Knowledges Common to Both MOSs

ID Nbr	Knowledge
1	Accurate Predicted Fire
5	Types & Capabilities of Ammo & Fuze Comb.
6	FMCS Procedures
12	Map Terrain Features and Symbols
13	Determining Azimuths on Maps
19	Radio and Radio Telephone Procedures
20	Signal Operations Instructions/Codes
21	TACFIRE Operations
22	Computer Communication & Message Formats
29	Battlefield Geometry
31	Plot Position
32	Technical Publications
36	Fire Mission Formatting
42	Antenna Installation
43	Artillery TARGET Intelligence
49	Fire Control Element Supervision

Number of Knowledges: 16

Knowledges Unique to MOS: 13C

ID Nbr	Knowledge	Rank
4	Capab & Limits of Art Weapons	16.5
23	Basic Electrical Troubleshooting	23
24	Comp Sys Trbleshooting & Maint.	12.5
25	Periph Device Trbleshooting & Maint.	7
26	Div Artillery Tactical Data Base	4.5
28	Electrical Theory	26.5
35	Computer Terminology	23
38	Tactical Fire Control Computation	7
40	Equipment Installation	26.5
41	Continuity of Operations	16.5
44	Emergency Field Patch	26.5
46	Control Entry to a Restricted Area	26.5

Number of Knowledges: 12

Percentage of MOS 13C Knowledges: 43%

Knowledges Unique to MOS: 13E

ID Nbr	Knowledge	Rank
2	Surveyed Firing Charts	5
3	Emergency Firing Chart	23
7	Tabular Firing Tables	1
8	Graphical Firing Tables	2
9	Computation of Site	4
11	Manual Fire Mission Processing	3
15	Precision Registration (Manual)	16
16	Graphical Intersection	16
17	Computer System Operations	8
18	Data Base Construction	12
27	Basic Mathematics	12

Number of Knowledges: 11

Percentage of MOS 13E Knowledges: 41%

Knowledges Not Used By Either MOS

ID Nbr	Knowledge
10	Firing Battery Operations
14	Emergency Fire Mission Processing
30	Mechanical Theory
33	Fire Direction Control Ops Procedures
34	FDS Data Base Construction
37	Firing Data Computation
39	Safety Procedures
48	Direction FDS Operations
47	Status Charts

Number of Knowledges: 9

Preparer's Name:

Rank:

MOS/AOC:

Date Prepared:

TKCAM provides a systematic procedure to identify *common* and *unique* knowledge requirements between two MOSs.

CHART 2

U.S. ARMY RESEARCH INSTITUTE

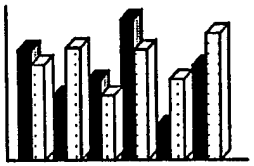
TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

THE ROLE OF SUBJECT MATTER EXPERTS

SME PANELS
Senior Enlisted Personnel

MOS X KNOWLEDGE REQUIREMENTS

MOS Y KNOWLEDGE REQUIREMENTS

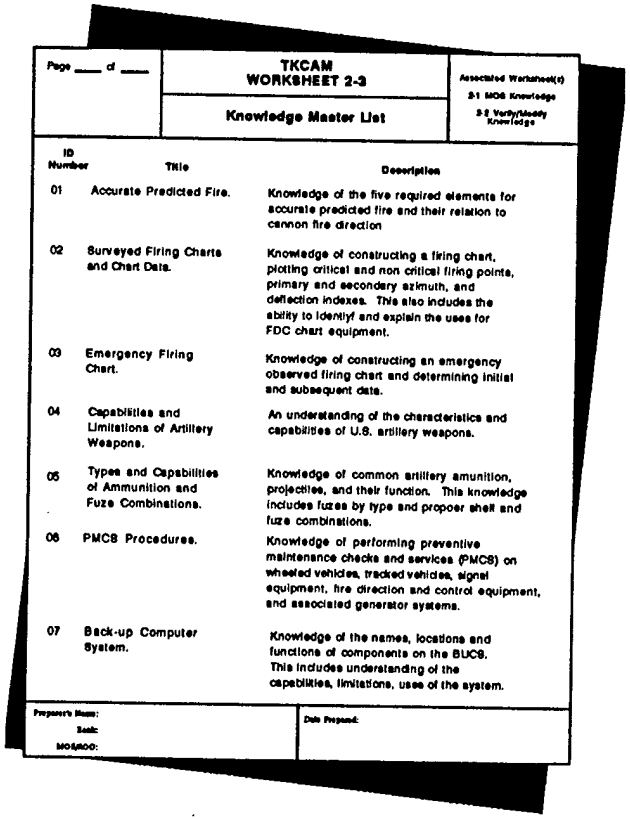


SIMILARITIES & DIFFERENCES?

- Assemble knowledge requirements
- Verify representativeness and completeness
- Assign knowlege requirements to MOS tasks

TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

SAMPLE KNOWLEDGE MASTER LIST



Page ___ of ___

TKCAM WORKSHEET 2-3

Knowledge Master List

Associated Worksheet(s)
2-1 MOS Knowledge
2-2 Verify/Modify Knowledge

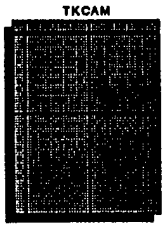
ID Number	Title	Description
01	Accurate Predicted Fire.	Knowledge of the five required elements for accurate predicted fire and their relation to cannon fire direction
02	Surveyed Firing Charts and Chart Data.	Knowledge of constructing a firing chart, plotting critical and non critical firing points, primary and secondary azimuth, and deflection indexes. This also includes the ability to identify and explain the uses for FDC chart equipment.
03	Emergency Firing Chart.	Knowledge of constructing an emergency observed firing chart and determining initial and subsequent data.
04	Capabilities and Limitations of Artillery Weapons.	An understanding of the characteristics and capabilities of U.S. artillery weapons.
05	Types and Capabilities of Ammunition and Fuze Combinations.	Knowledge of common artillery amunition, projectiles, and their function. This knowledge includes fuzes by type and proper shell and fuze combinations.
06	PMCS Procedures.	Knowledge of performing preventive maintenance checks and services (PMCS) on wheeled vehicles, tracked vehicles, signal equipment, fire direction and control equipment, and associated generator systems.
07	Back-up Computer System.	Knowledge of the names, locations and functions of components on the BUCS. This includes understanding of the capabilities, limitations, uses of the system.

Preparer's Name:
Rank:
MOS/ROC:

Date Prepared:

Based on USAFAS AFATDS MOS Project, 1993

CHART 4



TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

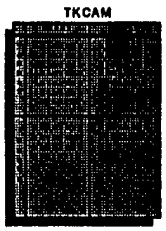
WHAT ARE "KNOWLEDGES" IN TKCAM?

"Specific classifications of knowledge needed by soldiers to perform in their MOSs. These are separate and discrete elements of generally theoretical or practical knowledge and not specifically task related."

---TKCAM User's Guide

EXAMPLES

- ✓ Principles of Electricity
- ✓ Accurate Predicted Fire
- ✗ M109 Turret Electrical Schematics



TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

CATEGORIES OF KNOWLEDGES

THEORY	Single theoretical concept, scientific principle, doctrine, set of rules or body of knowledge.
	Examples: Mathematics, Electricity, Cryptography
OBJECT	Physical items or classes of items about which the soldier must have knowledge in order to perform a task.
	Examples: Technical Manuals, Track Vehicle Suspension Systems
METHOD	Procedures or techniques that exist independent of any one equipment item with which the soldier must have knowledge.
	Examples: Electrical Troubleshooting, Arc Welding

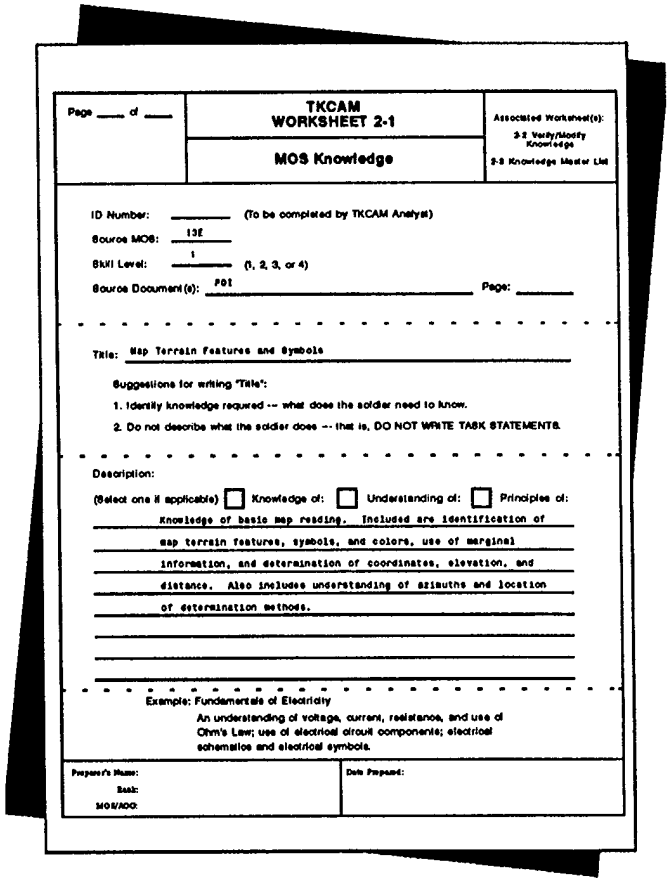
TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

KNOWLEDGE FORMAT

TWO KEY COMPONENTS:

- Title
- Description

plus Sources



Page ___ of ___

TKCAM WORKSHEET 2-1

MOS Knowledge

Associated Worksheet(s):
2-2 Verify/Modify Knowledge
2-3 Knowledge Master List

ID Number: _____ (To be completed by TKCAM Analyst)
Source MOS: 13E
Skill Level: 1 (1, 2, 3, or 4)
Source Document(s): POI Page: _____

Title: Map Terrain Features and Symbols

Suggestions for writing "Title":
1. Identify knowledge required -- what does the soldier need to know.
2. Do not describe what the soldier does -- that is, DO NOT WRITE TASK STATEMENTS.

Description:
(Select one if applicable) ☐ Knowledge of: ☐ Understanding of: ☐ Principles of:
Knowledge of basic map reading. Included are identification of map terrain features, symbols, and colors, use of marginal information, and determination of coordinates, elevation, and distance. Also includes understanding of azimuths and location of determination methods.

Example: Fundamentals of Electricity
An understanding of voltage, current, resistance, and use of Ohm's Law; use of electrical circuit components; electrical schematics and electrical symbols.

Preparer's Name:
Rank:
MOS/AOC:
Date Prepared:

CHART 7

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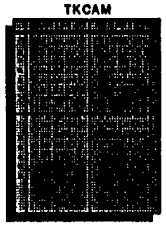


TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

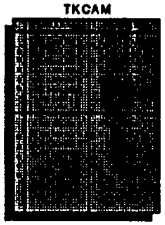
KNOWLEDGE FORMAT: TITLES

GUIDELINES

Brief, descriptive statements.
Begin with the most important element.

EXAMPLES

Theory	Electrical Theory; Circuits, Basic
Object	Batteries; Fire Control Systems
Method	Pneumatics, Troubleshooting of; Rigging



TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

KNOWLEDGE FORMAT: DESCRIPTIONS

GUIDELINES

Elaborate on knowledge expressed in title.
List related concepts, components, or methods.
Define range and depth of knowledge.
Pattern after POI style and wording.

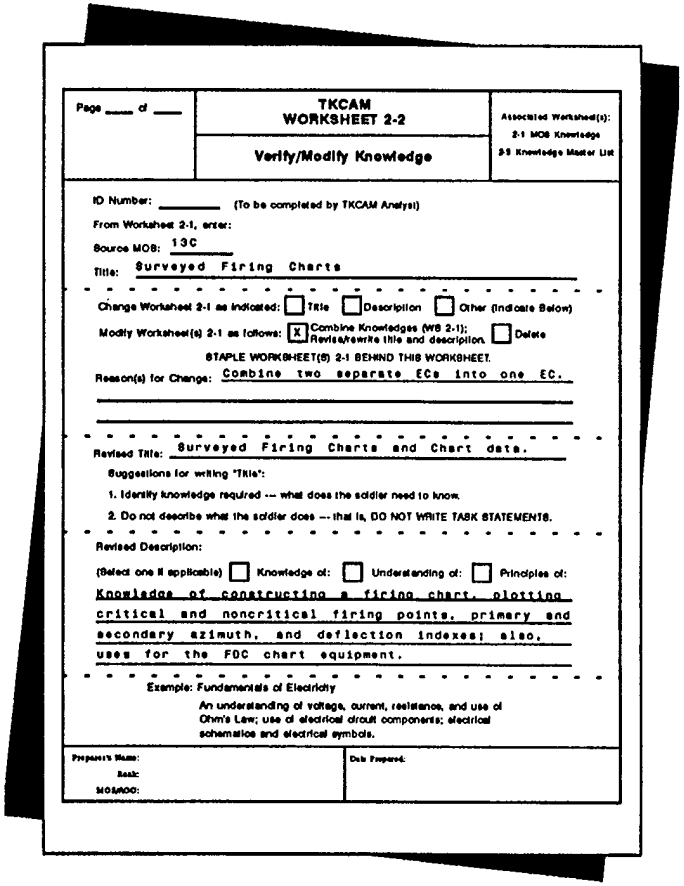
EXAMPLES

THEORY	Understanding of the electron theory of current flow, conductivity, negative electron methods of producing voltage, and components of electricity and their symbols. Includes understanding of the relationships between current, voltage, and resistance (Ohm's Law).
OBJECT	Knowledge of basic map reading. Included are identification of map terrain features, symbols and colors, use of marginal information, and determination of coordinates, elevation and distance.
METHOD	Knowledge of rigging techniques such as knot tying, construction of rope bridges, and preparing simple tackle systems.

TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

TKCAM WORKSHEET 2-2: VERIFY/MODIFY KNOWLEDGES

Example of Completed Worksheet



Page ____ of ____

TKCAM WORKSHEET 2-2

Verify/Modify Knowledge

Associated Worksheet(s):
2-1 MOS Knowledge
2-3 Knowledge Master List

ID Number: _____ (To be completed by TKCAM Analyst)

From Worksheet 2-1, enter:

Source MOS: 13C

Title: Surveyed Firing Charts

Change Worksheet 2-1 as indicated: ☐ Title ☐ Description ☐ Other (Indicate Below)

Modify Worksheet(s) 2-1 as follows: ☒ Combine Knowledges (WS 2-1); Revise/rewrite title and description. ☐ Delete

STAPLE WORKSHEET(S) 2-1 BEHIND THIS WORKSHEET.

Reason(s) for Change: Combine two separate ECs into one EC.

Revised Title: Surveyed Firing Charts and Chart data.

Suggestions for writing "Title":

1. Identify knowledge required --- what does the soldier need to know.
2. Do not describe what the soldier does --- that is, DO NOT WRITE TASK STATEMENTS.

Revised Description:

(Select one if applicable) ☐ Knowledge of: ☐ Understanding of: ☐ Principles of:

Knowledge of constructing a firing chart, plotting critical and noncritical firing points, primary and secondary azimuth, and deflection indexes; also, uses for the FDC chart equipment.

Example: Fundamentals of Electricity

An understanding of voltage, current, resistance, and use of Ohm's Law; use of electrical circuit components; electrical schematics and electrical symbols.

Preparer's Name:
Rank:
MOS/ASOC:

Date Prepared:

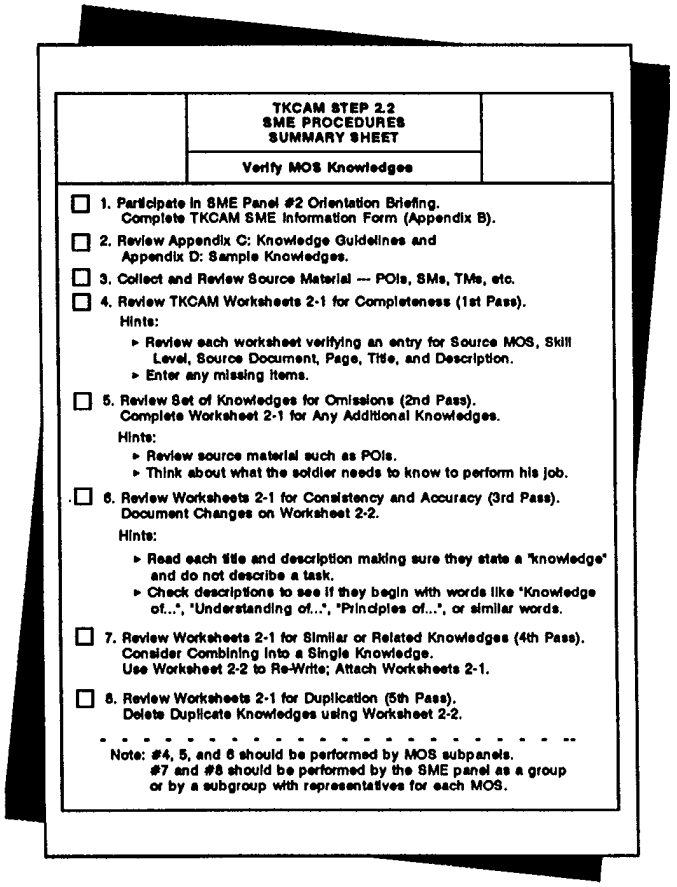
CHART 10

TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

VERIFY/MODIFY KNOWLEDGES: WORK PLAN

Steps for Verifying/Modifying Knowledges

- ▸ Review Knowledge Guidelines
- ▸ Review Sample Knowledges
- ▸ Review Source Material
- ▸ Review Worksheets 2-1 for
  - Completeness
  - Omissions
  - Consistency and Accuracy
  - Similarity
  - Duplication.
- ▸ Recommend Changes to Worksheets 2-1 Documenting Changes on Worksheets 2-2.



TKCAM STEP 2.2
SME PROCEDURES
SUMMARY SHEET

Verify MOS Knowledges

☐ 1. Participate in SME Panel #2 Orientation Briefing.
Complete TKCAM SME Information Form (Appendix B).

☐ 2. Review Appendix C: Knowledge Guidelines and
Appendix D: Sample Knowledges.

☐ 3. Collect and Review Source Material — POIs, SMs, TMs, etc.

☐ 4. Review TKCAM Worksheets 2-1 for Completeness (1st Pass).

Hints:

- ▸ Review each worksheet verifying an entry for Source MOS, Skill Level, Source Document, Page, Title, and Description.
- ▸ Enter any missing items.

☐ 5. Review Set of Knowledges for Omissions (2nd Pass).
Complete Worksheet 2-1 for Any Additional Knowledges.

Hints:

- ▸ Review source material such as POIs.
- ▸ Think about what the soldier needs to know to perform his job.

☐ 6. Review Worksheets 2-1 for Consistency and Accuracy (3rd Pass).
Document Changes on Worksheet 2-2.

Hints:

- ▸ Read each title and description making sure they state a "knowledge" and do not describe a task.
- ▸ Check descriptions to see if they begin with words like "Knowledge of...", "Understanding of...", "Principles of...", or similar words.

☐ 7. Review Worksheets 2-1 for Similar or Related Knowledges (4th Pass).
Consider Combining into a Single Knowledge.
Use Worksheet 2-2 to Re-Write; Attach Worksheets 2-1.

☐ 8. Review Worksheets 2-1 for Duplication (5th Pass).
Delete Duplicate Knowledges using Worksheet 2-2.

Note: #4, 5, and 6 should be performed by MOS subpanels.
#7 and #8 should be performed by the SME panel as a group or by a subgroup with representatives for each MOS.

APPENDIX H

SUBJECT MATTER EXPERT PANEL #3
ORIENTATION PACKAGE

SME PANEL #3 ORIENTATION PACKAGE

This briefing guide has been prepared for the TKCAM Analyst to use in orienting members of SME Panel #3. The orientation briefing is designed to familiarize the SMEs with what TKCAM is, what their roles are as members of the third TKCAM panel, and how they can accomplish their principal task, namely, matching knowledges to tasks.

The briefing guide is presented in two parts: (1) a briefing script and (2) a set of briefing charts. The script describes the key points of information that the TKCAM Analyst needs to explain to the SMEs. The briefing charts can be used along with the script in making an orientation briefing to the SMEs. In addition, the charts may be distributed to the SMEs with or without the script as the TKCAM Analyst chooses.

BRIEFING SCRIPT

CHART 1: WHAT IS TKCAM?

Issues are frequently raised in regards to restructuring existing MOSs. The restructuring may involve combining existing MOSs, breaking them apart into more specialized MOSs, or changing an MOS's task content or other features, among possible types of restructurings.

When the need arises, Army regulations, particularly, AR 611-1, Military Occupational Classification Structure Development and Implementation, and AR 611-201, Enlisted Career Management Fields and Military Occupational Specialties, specify the procedural requirements for making such changes. These regulations and other Army guidance, however, generally do not explain how to arrive at restructuring decisions. That is, how are such decisions made?

TKCAM, the Task Knowledges Commonality Analysis Method, is one method to aid in systematically assessing the feasibility of restructuring MOSs based on common knowledge requirements. TKCAM is designed to be used in a relatively short time frame with a minimal level of effort by analysts, who are not necessarily specialists in occupational analysis.

CHART 2: THE MOS COMPARISON MATRIX: A SYSTEMATIC WAY TO ASSESS FEASIBILITY

TKCAM's principal means for introducing reason into the restructuring decision is a comparison of the knowledge requirements between two MOSs. Using the TKCAM procedures, a comparison matrix is developed which identifies the common and unique knowledge requirements.

In the "northwest" corner of the matrix, the knowledges that are common to both MOSs are listed. In the "southwest" and "northeast" quadrants are listed the knowledges that are unique to one or the other MOS. When there are mostly common knowledge requirements and few unique requirements, restructuring the MOSs may be feasible from the perspective of their knowledge requirements. Since the "knowledge requirements" may also be indicators of job complexity, training demands, among other job characteristics, such information can be very useful in establishing the feasibility of a restructuring.

The comparison matrix is developed using a set of knowledge requirements. The knowledges are developed by SMEs, usually senior NCOs with both field and training experience, who work together for 2-3 days. Their job is to identify and briefly describe all the knowledges associated with their MOS.

CHART 3: THE ROLE OF SUBJECT MATTER EXPERTS ON PANEL #3

In conducting a TKCAM application, there are three SME panels which help develop the knowledge data that are used to build the comparison matrix. The purpose of the first panel is to identify and describe the knowledge requirements of the MOSs being considered for restructuring. A second SME panel reviews and verifies the knowledges to insure their completeness and accuracy. Then, the knowledges are organized by the TKCAM Analyst into a Knowledge Master List. The analyst also prepares an MOS Task List, listing the key tasks for each MOS in the study.

Then, a third panel, comprised of two SMEs for each MOS working together in subgroups, determines which knowledges on the master list are required to perform each task. The SMEs essentially match the required knowledges to the tasks. To accomplish this task, the SMEs need to know:

- What "knowledges" are in TKCAM,
- How to match knowledges to tasks.

The purpose of this briefing is to provide SMEs serving on the third panel with these basic understandings.

After the third panel completes its work, the TKCAM Analyst will the data to develop MOS Knowledge Profiles, an MOS Comparison Matrix for each pair of MOSs in the study, and recommendations pertaining to any restructuring.

CHART 4: WHAT ARE "KNOWLEDGES"?

"Knowledges" are what soldiers need to know to perform their jobs. These are specific classifications of theoretical and practical knowledge. They are not specifically task related, that is, one or more may be required to perform a task and more than one task may require the same knowledge(s).

Examples of knowledges are "Principles of Electricity" and "Accurate Predicted Fire", both of which were identified as part of TKCAM application related to field artillery. "M109 Turret Electrical Schematics" is an example of a type of knowledge which, in the particular application, was considered to be too specific and too task-related because of its "M109 Turret" reference; understanding and interpreting electrical schematics without qualification would have been appropriate.

CHART 5: TKCAM WORKSHEET 2-3: KNOWLEDGE MASTER LIST

This chart illustrates the first page of a Knowledge Master List developed as part of a TKCAM application done at Fort Sill in 1993. The list contains about 75 knowledges, all tied to one or more fire direction control MOSs.

There are two key elements to describing a knowledge: (1) its title and (2) its description. SMEs on the first panel are responsible for identifying the knowledges and documenting them in terms of these two elements using TKCAM Worksheet 2-1. SMEs on the second panel are responsible for reviewing the first panel's worksheets insuring that the set of knowledges is complete and that the individual knowledges are identified and described accurately. The TKCAM Analyst assembles this material into a Knowledge Master List (Worksheet 2-3).

Note to TKCAM Analyst: Handout and review Worksheet 2-3, Knowledge Master List, that was prepared in Step 2.3.

CHART 6: TKCAM WORKSHEET 2-4: MOS TASK LIST

The tasks of each MOS under study are listed on Worksheet 2-4. Usually, critical tasks, which are a subset of an MOS's total tasks, are used. These focus TKCAM analysis on only those elements of that MOS's duties that are most important and most definitive.

On the right-hand side of Worksheet 2-4, adjacent to the "Task Title", space is provided to record the ID Numbers of the knowledges that are required to perform the task.

SMEs examine each task, identify the knowledges required for performing it, and record the ID Numbers in the space provided. More than one knowledge may be required to perform a task.

Note to TKCAM Analyst: Handout and discuss Worksheet 2-4, MOS Task List, that was prepared in Step 2.4.

CHART 7: MATCHING KNOWLEDGES TO TASKS: WORK PLAN

The TKCAM Analyst, in conjunction with the SMEs, should establish a work plan to guide and control the effort. The plan should include the following tasks.

First, the SMEs should review the guidelines for matching knowledges to tasks in Appendix C. The guidelines explain what knowledges are and how to match knowledges to tasks.

Working in MOS teams and using the Knowledge Master List for reference, SMEs should identify all of the knowledges needed to perform the MOS's tasks. Record the "ID Number" of the knowledges on the task lists (Worksheet 2-4) next to the tasks for which they are required.

The SMEs should keep in mind the difference between the background knowledge one needs to *learn* a task and the task-relevant knowledge one needs to *perform* the task once it has been learned. Record only those enabling criteria needed to perform the task.

Each task should be reviewed independently. Ignore the other tasks on the list and associated tasks that may not be on the list. For example, if a maintenance task is "Replace Item A", assign only those knowledges that are required to *replace* the item. Do not record those needed to first remove Item A, even though that is the task that would logically precede the "replace" task.

Also when reviewing the tasks, think about any tools, manuals, or special equipment that are needed to perform the tasks. The knowledges that apply to those are part of the task's knowledge requirements as well.

More than one knowledge may apply to a single task. Choose those providing the greatest detail.

If there are knowledge requirements that do not appear on the Knowledge Master List (Worksheet 2-3), the omission should be discussed with the TKCAM Analyst. If the TKCAM Analyst approves, the knowledge will be added to the master list and an ID Number will be assigned for subsequent use.

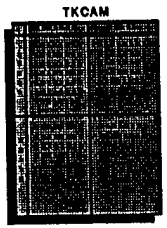
The matching process should continue until knowledges have been identified for all tasks on Worksheet 2-4.

The entire process for SME Panel #3 usually takes 1-2 days.

Note to TKCAM Analyst:

In concluding the orientation, the TKCAM Analyst should provide the SMEs with some examples illustrating how knowledges listed on the Knowledge Master List (Worksheet 2-3) are matched to tasks listed on the MOS Task List (Worksheet 2-4). To accomplish this, the TKCAM Analyst should prepare several examples prior to the orientation.

BRIEFING CHARTS



TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

WHAT IS TKCAM?

Issues frequently are raised in regards to restructuring MOSs.

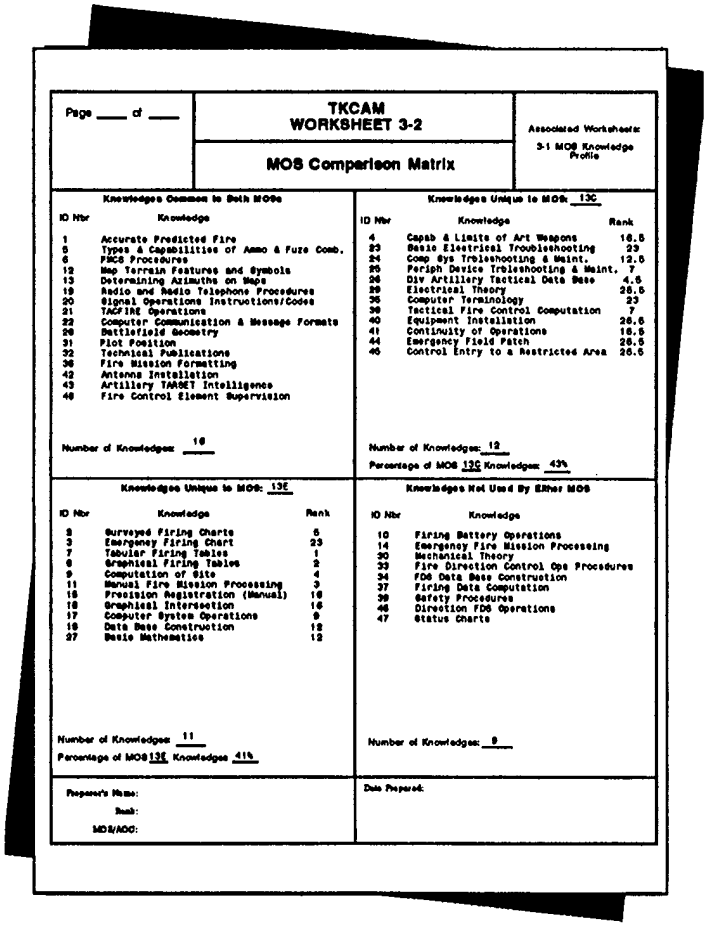
AR 611-1, Military Occupational Classification Structure Development and Implementation, states the requirements for restructuring.

But, it does not explain how.

TKCAM is one method to aid in systematically assessing the feasibility of restructuring MOSs based on common knowledge requirements.

TKCAM

TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD



Page ___ of ___

TKCAM WORKSHEET 3-2

MOS Comparison Matrix

Associated Worksheets: 3-1 MOS Knowledge Profile

Knowledges Common to Both MOSs

ID Nbr	Knowledge
1	Accurate Predicted Fire
5	Types & Capabilities of Ammo & Fuze Comb.
6	FDCS Procedures
12	Map Terrain Features and Symbols
13	Determining Azimuths on Maps
19	Radio and Radio Telephone Procedures
20	Signal Operations Instructions/Codes
21	TACFIRE Operations
22	Computer Communication & Message Formats
28	Battlefield Geometry
31	Plot Position
32	Technical Publications
36	Fire Mission Formatting
42	Antenna Installation
43	Artillery TARGET Intelligence
48	Fire Control Element Supervision

Number of Knowledges: 16

Knowledges Unique to MOS: 13C

ID Nbr	Knowledge	Rank
4	Capab & Limits of Art Weapons	18.5
23	Basic Electrical Troubleshooting	23
24	Comp Sys Trbleshooting & Maint.	12.5
25	Periph Device Trbleshooting & Maint.	7
26	Div Artillery Tactical Data Base	4.5
29	Electrical Theory	26.5
35	Computer Terminology	23
38	Tactical Fire Control Computation	7
40	Equipment Installation	26.5
41	Continuity of Operations	18.5
44	Emergency Field Patch	26.5
46	Control Entry to a Restricted Area	26.5

Number of Knowledges: 12

Percentage of MOS 13C Knowledges: 43%

Knowledges Unique to MOS: 13E

ID Nbr	Knowledge	Rank
8	Surveyed Firing Charts	6
3	Emergency Firing Chart	23
7	Tabular Firing Tables	1
8	Graphical Firing Tables	2
9	Computation of Site	4
11	Manual Fire Mission Processing	3
15	Precision Registration (Manual)	16
16	Graphical Intersection	16
17	Computer System Operations	9
18	Data Base Construction	12
27	Basic Mathematics	12

Number of Knowledges: 11

Percentage of MOS 13E Knowledges: 41%

Knowledges Not Used By Either MOS

ID Nbr	Knowledge
10	Firing Battery Operations
14	Emergency Fire Mission Processing
30	Mechanical Theory
33	Fire Direction Control Ops Procedures
34	FDC Data Base Construction
37	Firing Data Computation
39	Safety Procedures
45	Direction FDC Operations
47	Status Charts

Number of Knowledges: 9

Preparer's Name:

Rank:

MOS/AOC:

Date Prepared:

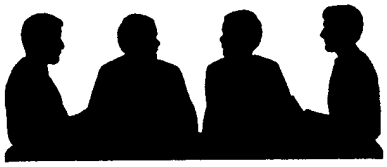
TKCAM provides a systematic procedure to identify *common* and *unique* knowledge requirements between two MOSs.

CHART 2

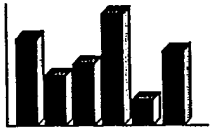
U.S. ARMY RESEARCH INSTITUTE

TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

THE ROLE OF SUBJECT MATTER EXPERTS

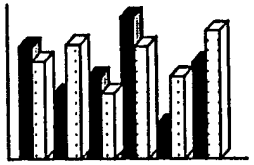


SME PANELS
Senior Enlisted Personnel



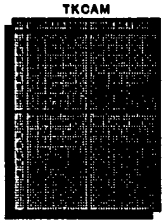
MOS X KNOWLEDGE REQUIREMENTS

MOS Y KNOWLEDGE REQUIREMENTS



SIMILARITIES & DIFFERENCES?

- Assemble knowledge requirements
- Verify representativeness and completeness
- Assign knowlege requirements to MOS tasks



TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

WHAT ARE "KNOWLEDGES" IN TKCAM?

"Specific classifications of knowledge needed by soldiers to perform in their MOSs. These are separate and discrete elements of generally theoretical or practical knowledge and not specifically task related."

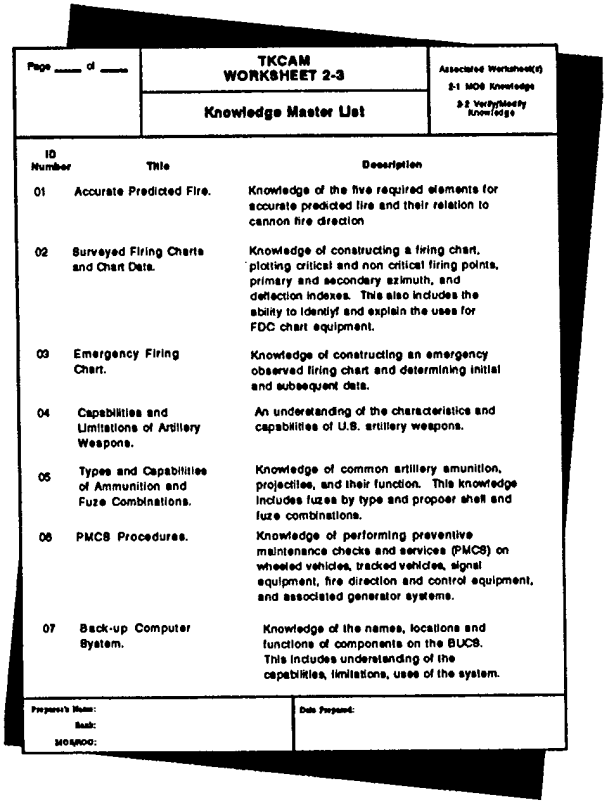
---TKCAM User's Guide

EXAMPLES

- ✓ Principles of Electricity
- ✓ Accurate Predicted Fire
- ✗ M109 Turret Electrical Schematics

TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

SAMPLE KNOWLEDGE MASTER LIST



Page ____ of ____

TKCAM WORKSHEET 2-3

Knowledge Master List

Associated Worksheet(s):
2-1 MOS Knowledge
2-2 Verify/Modify Knowledge

ID Number	Title	Description
01	Accurate Predicted Fire.	Knowledge of the five required elements for accurate predicted fire and their relation to cannon fire direction
02	Surveyed Firing Charts and Chart Data.	Knowledge of constructing a firing chart, plotting critical and non critical firing points, primary and secondary azimuth, and deflection indexes. This also includes the ability to identify and explain the uses for FDC chart equipment.
03	Emergency Firing Chart.	Knowledge of constructing an emergency observed firing chart and determining initial and subsequent data.
04	Capabilities and Limitations of Artillery Weapons.	An understanding of the characteristics and capabilities of U.S. artillery weapons.
05	Types and Capabilities of Ammunition and Fuze Combinations.	Knowledge of common artillery amunition, projectiles, and their function. This knowledge includes fuzes by type and propoer shell and fuze combinations.
06	PMCS Procedures.	Knowledge of performing preventive maintenance checks and services (PMCS) on wheeled vehicles, tracked vehicles, signal equipment, fire direction and control equipment, and associated generator systems.
07	Back-up Computer System.	Knowledge of the names, locations and functions of components on the BUCS. This includes understanding of the capabilities, limitations, uses of the system.

Preparer's Name:
Rank:
MOS/ROC:

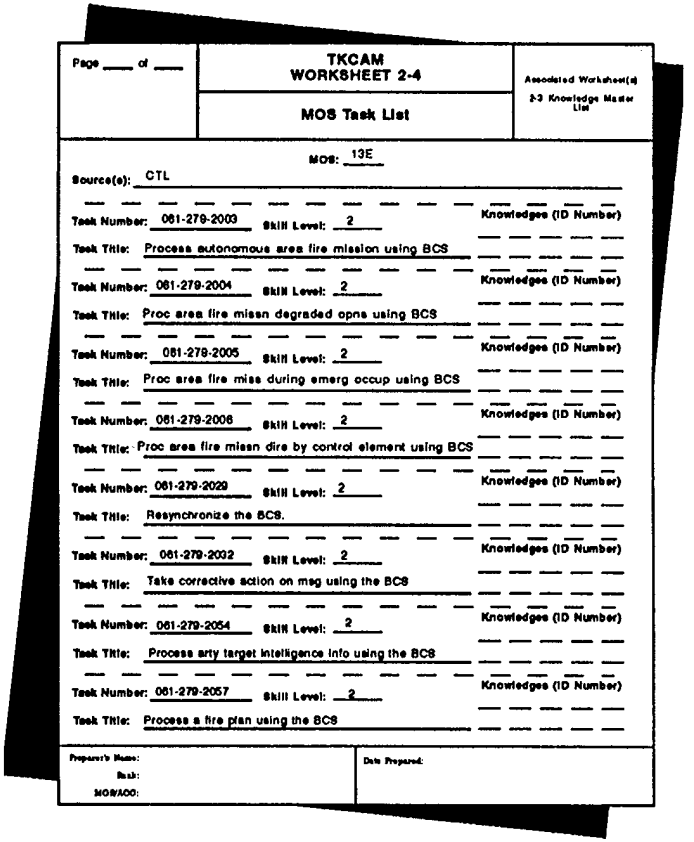
Date Prepared:

Based on USAFAS AFATDS MOS Project, 1993

TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

TKCAM WORKSHEET 2-4: MOS TASK LIST

Worksheet Used in Step 2.4 to record MOS tasks and in Step 2.5 to match knowledges to tasks



Page ____ of ____

TKCAM WORKSHEET 2-4

MOS Task List

Associated Worksheet(s): 2-3 Knowledge Master List

MOS: 13E

Source(s): CTL

Task Number	Skill Level	Task Title	Knowledges (ID Number)
061-279-2003	2	Process autonomous area fire mission using BCS	
061-279-2004	2	Proc area fire missn degraded opns using BCS	
061-279-2005	2	Proc area fire miss during emerg occup using BCS	
061-279-2006	2	Proc area fire missn dire by control element using BCS	
061-279-2029	2	Resynchronize the BCS.	
061-279-2032	2	Take corrective action on msg using the BCS	
061-279-2054	2	Process arty target intelligence info using the BCS	
061-279-2057	2	Process a fire plan using the BCS	

Preparer's Name:
Rank:
MOS/AOC:

Date Prepared:

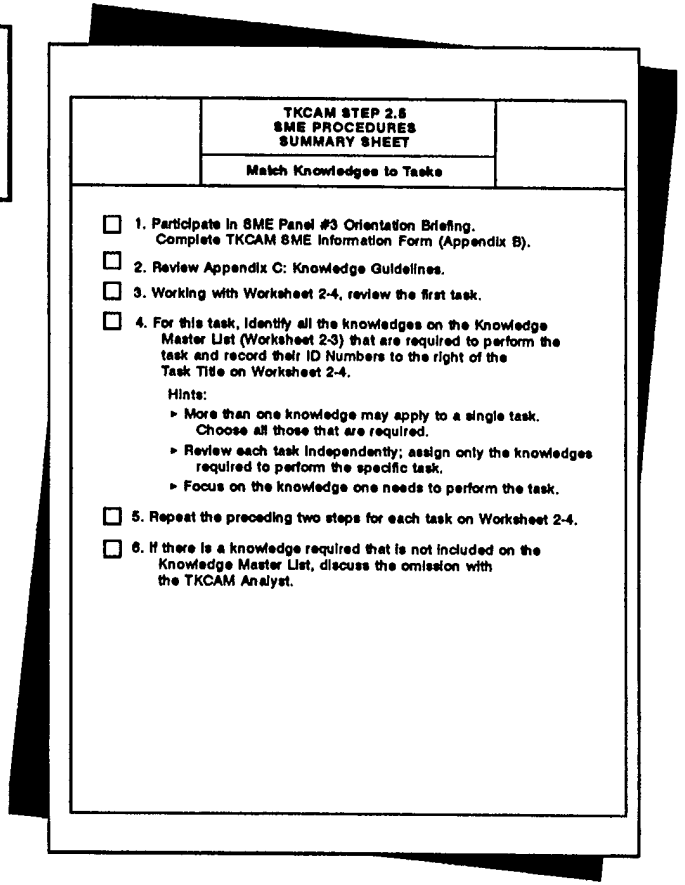
Based on USAFAS AFATDS MOS Project, 1993

TASK KNOWLEDGES COMMONALITY ANALYSIS METHOD

MATCH KNOWLEDGES TO TASKS: WORK PLAN

Steps for Matching Knowledges to Tasks:

- Review Knowledge Guidelines
- Review Source Material
- Examine Each Task on Worksheets 2-4
- Scan Knowledge Master List (Worksheet 2-3) for Knowledges Required to Perform Each Task



TKCAM STEP 2.6
SME PROCEDURES
SUMMARY SHEET

Match Knowledges to Tasks

- ☐ 1. Participate in SME Panel #3 Orientation Briefing. Complete TKCAM SME Information Form (Appendix B).
- ☐ 2. Review Appendix C: Knowledge Guidelines.
- ☐ 3. Working with Worksheet 2-4, review the first task.
- ☐ 4. For this task, identify all the knowledges on the Knowledge Master List (Worksheet 2-3) that are required to perform the task and record their ID Numbers to the right of the Task Title on Worksheet 2-4.

  Hints:
  - ▸ More than one knowledge may apply to a single task. Choose all those that are required.
  - ▸ Review each task independently; assign only the knowledges required to perform the specific task.
  - ▸ Focus on the knowledge one needs to perform the task.
- ☐ 5. Repeat the preceding two steps for each task on Worksheet 2-4.
- ☐ 6. If there is a knowledge required that is not included on the Knowledge Master List, discuss the omission with the TKCAM Analyst.